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Half-bred ewes in Doddington Park

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Cover photograph: Half-bred ewes in Doddington Park *Photo: Tyrer*

The Small Farm on Heavy Land

IAN G. REID, B.SC.(ECON.), DIP. AGRIC.(CANTAB.)
Department of Agricultural Economics, Wye College (University of London)

A discussion of some of the difficulties facing the small farmer, and some ways in which he can improve his net output, as he must if he is to earn a satisfactory living in conditions of increasing competition.

WITHIN the pattern of British farming there have always been small farms, whether measured by acres or by output. They may be considered a legacy of a subsistence economy, where the object is to provide only the necessities of food, drink, clothing and shelter. It can doubtless be argued that on many small family farms such an aim is still predominant. When the aims or the standard of subsistence change and become more sumptuous, social difficulties arise. An exchange and money economy must then be introduced, with an ever-increasing level of productivity. If this cannot be achieved, the farming becomes only a part-time occupation to be supplemented by other work in mill, factory, market, office or on some other farm. This social aspect has been the mainspring of much agricultural legislation, culminating in the Agriculture (Small Farmers) Act, 1959.

Small farms in Britain, classified on acreage, tend to be concentrated in Devon and Cornwall, the Pennine area of Yorkshire and Lancashire, the Isle of Ely, Cheshire, Wales, and the Weald of south-east England. Some of these areas have rich soils where a few acres can provide a good-sized business, sufficient to support more than a modest standard of material comfort. But most are regions of poor soil, often ill-drained and acid, polluted by industrial smoke, of sharp relief and at high elevations where inclement weather adds yet one more hazard. No matter where they are, the small farms supporting an inadequate size of business have certain common features which must be ameliorated or eliminated if their occupiers are, as the White Paper[1] states, "to earn a satisfactory living in conditions of increasing competition".

Small Wealden farms typical

To many people, south-east England may not come first to mind as an area of small farms. It has, however, the peculiar distinction that in recent years the number of farms under 100 acres has increased. The great majority of the small farms are on the Weald, which covers 40 per cent of Kent, Surrey, and East and West Sussex, and whose soil "many generations of cultivators have found both expensive to cultivate and ungrateful to handle".[2] Some fifty years ago, Hall and Russell wrote that "the Weald was never highly farmed and has always been regarded as poor, backward, unimproved country, the more so by contrast with the highly cultivated sand and alluvial soils close at hand".[2] Recent studies[3, 4] by the Department of Agricultural Economics, Wye College, have confirmed this opinion, and shown that small farms in this area have the usual symptoms and characteristics of their type. Thus lessons learned in farm management advisory work in this area may be applicable to other regions of Britain.

It is a truism to say that profit is the difference between output and expenditure. Yet any plan submitted under the Small Farmer Scheme must obviously be directed towards increasing output or reducing costs, or both. An expansion of the farm business could come from increasing the proportion of the farm under cash crops, or from raising the stocking rate on the present grassland. It could also be done by enlarging pig or poultry enterprises, which are only indirectly connected with the acres of a farm; or by eliminating some unprofitable enterprise. An expansion could also come from increasing the yield of the livestock or crops.

The possibilities of reducing costs to boost profitability on a small farm are probably few. Labour is usually provided by the family, and often paid by taking what is left after all the other bills have been met. Many other costs are fixed, except those of bought feedingstuffs. These, being the easiest to reduce, and because nothing precise is known about their use, may well be cut indiscriminately, with detriment to farm profit.

Importance of yield

How, then, does the present condition of small farms on heavy land influence possible progress along the lines suggested? Output depends on the combination of enterprises comprising the farming system, and on their respective yields. This combination is a reflection of such factors as the supply of working capital and fixed equipment. Livestock production usually requires more capital per unit of output than does arable farming. Where dairying, pigs and poultry are the main enterprises, as so often on small farms, housing accommodation adds to this expense. Yet it is characteristic of these farms that they are short of capital and of buildings. The higher profits of some of the farms in these areas seem to stem more from higher yields than from more intensive systems of farming, with heavier stocking rates or larger proportions of the farm under cash crops. On many farms, modern techniques of grassland production and management have created an imbalance between the capacity of the land and that of the buildings. Until the accommodation is increased the potential productivity of the land will not be profitably used. The smallness of the acreages involved, the bad drainage, shading of trees, copses and overbearing hedgerows, all make arable crops hazardous as an alternative way of increasing farm output.

These rigidities of insufficient capital, ill-drained, intractable soil and inadequate fixed equipment give an added importance to the factor of yield, because it then becomes the main way in which output can be increased. Grants are available under both the Farm Improvement and Drainage Schemes to help overcome these limiting factors. But in many cases, the provision of two-thirds or even one-half of the total sum required may prove beyond pocket or prudent inclination.

A study of the various reports[5–8] published by Departments of Agricultural Economics seems to show that small farms are weak in this very point. Almost everywhere the Yield Index tends to fall as size of farm (measured in acres) decreases. The periodic reports[9] of the National Investigation into the Economics of Milk Production also show that the average yield per cow, and milk sales per cow and per feed acre, are generally lowest in the small herds on small farms.

Such trends are against accepted ideas: it is usually thought that the small farmer's one advantage over his larger neighbour is the individual attention he can devote to each enterprise. This personal attention has always been considered most important where animals are concerned, and as the small farm is usually based almost entirely on livestock, a considerable advantage should accrue. The important consequences of this were shown in a recent report,[3] where it was stated that "if the typical small dairy farmer with his 16 cows got the same yields and price per gallon for his milk as his neighbours on the larger dairy farm, his annual milk sales would have been £225 more than they actually were—at no greater expense".

There may be many causes for this difference in performance. It may be a sign of the lack of capital to buy better stock, particularly cows, or lack of knowledge and skill. Whatever the cause, it is something which the small farmer can ill afford, and a fundamental challenge to any scheme for improving his competitive position. Until progress is made in this direction, he will always remain at a relative disadvantage.

It can be argued that the cash needs of many of the farmers in these poor land areas are low because their aims are modest. Thus low output may be satisfactory as long as expenses are also low. In such cases traditional experience may suffice to reach these moderate levels of performance. But when there is the urgency of cash income to support a more sophisticated living, or tractor power using imported fuel rather than horse power eating home-grown fodder, then a high level of technical skill and competence is also required.

Importance of drainage

The fact that many small farms are on poor land leads inevitably to low yields of crops. The elevation or poor drainage often means short grazing seasons, and so a greater need for the conservation of fodder, with consequent loss of feed value and greater expense. Each of these factors affects the provision and use of feed for the livestock. Good yields of crops and grass are dependent upon the fertility of the soil, drainage, and timeliness of cultivations. Where drainage is good, fertility can be induced more easily and field work made more timely. The importance of good drainage has been recognized in Government agricultural policy for the past twenty years, yet even now many plans being submitted under the Small Farmer Scheme contain proposals for ditching. There is evidence, too, that land which received a drainage grant in the early 1940s has already become waterlogged through neglect of ditches. On too few farms is ditching considered as a regular feature of maintenance and cultivation.

Drainage of areas predominantly under grassland suffers, however, from certain economic drawbacks. It is pointless to improve the productivity of the soil unless it can be exploited, and with grassland this may well involve a triple application of capital for drainage, more livestock, and probably for more buildings to accommodate them, in so far as the very nature of the soil will mean that cattle must be housed in wet and winter periods. This might be avoided if the extra grass could be substituted directly for concentrate feedingstuffs. Such a change is more difficult than is sometimes suggested, partly because the quality of the conserved grass is often poor. To achieve a

level of output sufficient to meet the high fixed costs of the small farm, considerable quantities of concentrate feedingstuffs are fed to cows, pigs and poultry. Experience in farm management advisory work, however, shows that the precise allocation of these feedingstuffs to the various classes of livestock is seldom known with any accuracy. Without this knowledge it is impossible to tell whether any one of them has a satisfactory margin between the cost of the feed and the value of the livestock product. Thus the main chance for making the most profitable use of the largest single item of cost is lost. An absolute reduction in this item through the avoidance of waste might also provide some capital, of which small farms always seem so short.

Government grants

No farm business can expand and few costs can be cut without investing capital in more livestock, buildings, drainage, fertilizers, seeds and so on. The Small Farmer Scheme is aimed at providing some of this capital, up to £1,000 per farm, on condition that an approved plan is executed.

The inadequate buildings and poor drainage of small farms on heavy land will be major factors in many farm plans. Grants of one-third of the cost of an approved scheme for the improvement of buildings are payable under the Farm Improvement Scheme. The Farm Business Grant can be spent to provide the farmer's two-thirds of the cost of buildings only in an indirect way. The farmer may be able to switch money intended for seed, fertilizers, machinery, and so on into buildings, and buy these other items with the Business Grants. He may also be able to turn some of his accommodation for young stock into housing for cows. Small farmers often keep too many young stock, especially now that the health and longevity of cows will improve with the progress of the Attestation Scheme.

With regard to drainage, it seems that the first step will be to apply for help under the Supplementary Scheme, so that a total grant of 85 per cent of the cost of ditching may be gained. When this basic improvement has been made, it will be possible to come into the full scheme, where the generous ploughing grants make a major contribution to working capital.

If capital budgets are drawn up to match the receipts from grants and additional gross profits with the capital requirements for expansion and grassland improvement, it is soon realized that even modest farm plans will require a tenacity of purpose. Increased profits will often have to be ploughed back for the first two to four years. Using such money for increased personal expenditure at an early stage may well mean that the extra cows cannot be bought, and their subsequent contributions to extra farm profit will be foregone. The whole effort to reach and maintain a more competitive position with a more satisfactory living will be undermined.

The Field Husbandry Grants under the Small Farmer Scheme are directed to improving grassland. If this is not to remain a pointless technical achievement, the small farmer must realize that he must increase his net output to meet the higher costs which the improvement will involve. He can do it by keeping more livestock or growing more cash crops, by increasing livestock yields through feeding more and better bulky feeds. If he does not get a higher net output, he will be in a weaker competitive position with a lower

standard of living. These are the problems challenging anyone whose system of farming is based upon the use of grassland.

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Extended Autumn Grazing for Beef

J. C. TAYLER, M.A., DIP. AGRIC.(CANTAB.) and J. E. RUDMAN, B.SC.

The Grassland Research Institute, Hurley, Berks

Nitrogenous fertilizers applied in late summer will extend autumn grazing for fattening steers; lucerne and grass sown in alternate rows will enable production to be kept high from both legume and fertilizer nitrogen.

HIGHER yields of home-produced beef are wanted, and a recent survey[1] has emphasized the need to spread the autumn peak of slaughter into winter. When nitrogenous fertilizers are used to increase grass production for fattening cattle, three main questions arise. Does the use of fertilizer adversely affect the rate of fattening? Can the supply of soil nitrogen from legumes be maintained, even when nitrogenous fertilizer is used? How far can fertilizer nitrogen be used to level out the seasonal pattern of herbage production, and extend grazing into early winter after continuous summer stocking?

The third problem applies particularly to autumn-born cattle intended for slaughter at about two years of age, such as the Hereford colour-marked steers from dairy herds used in grazing trials at the Grassland Research Institute. These will benefit from a long finishing period, particularly when they have been cheaply wintered as yearlings. The national peak of autumn slaughter has tended to create a seasonal pattern of price per pound of dressed carcass which reaches its lowest in October and early November: increased demand and rapidly rising prices in December have normally encouraged the extension of fattening into the winter months. Late summer dressings of nitrogenous fertilizer provide a means of increasing out-of-

season grazing. With the above questions in mind, two experiments have been carried out at the Institute in the past four years to investigate the use of nitrogenous fertilizers in beef production on swards of varying botanical composition.

Nitrogen on ryegrass/white clover swards

The first trial was laid down on a ryegrass/white clover sward in its fourth and fifth harvest years in 1955 and 1956. Rates of application of 0, 6 and 12 cwt per acre of "Nitro-Chalk" were compared, the fertilizer being applied in three dressings of either 2 or 4 cwt to the acre. One application was made in April or May, and the remaining two between July and September, to level out the seasonal pattern of herbage production. Each treatment was stocked at the same rate, namely 1½ steers per acre. Excess spring herbage was conserved as hay and silage and fed back later to the same cattle.

The grazing season was shortened in 1955 by the very dry weather of July and August, during which hay made on the plots in June was fed to the cattle for one month. Even so, the cattle were carried for an extended period of three weeks at the 6 cwt application of "Nitro-Chalk", and for an extended period of four weeks at the 12 cwt level, this on extra grazing and silage conserved in May. The 12 cwt "Nitro-Chalk" group were slaughtered on 11th November following 6½ months on treatment including both grazing and conserved feed. An extra 79 lb of liveweight gain per acre resulted from the 6 cwt and 102 lb from the 12 cwt level of "Nitro-Chalk" application. An economic return was obtained from the three dressings at 2 cwt per acre, but the three applications of 4 cwt were not fully utilized in this dry season.

July's dry spell seriously reduced the clover content in all treatments, to the extent that production was affected on the no-nitrogen plots in 1956. In this second season of the experiment, the April dressing of "Nitro-Chalk" on the fertilizer treatments produced sufficient growth to carry the stock over a dry spell in May, and also to provide silage and hay, but the control plots had no such reserve of keep. In these low-clover plots, receiving no fertilizer nitrogen, a period of low herbage availability resulted in reduced liveweight gains by the cattle in mid-season, despite rapid rotation of the stock round the plots. Because of the reduced vigour of the control plots, herbage yields were materially higher on the treatments receiving "Nitro-Chalk". An extra seven and nine weeks on treatment grazing and conserved feed were obtained from the 6 and 12 cwt levels of application respectively. Carcass gains per head were greater by over 100 lb, and a bigger proportion were graded A in the nitrogen groups than in the control group. Both groups on the nitrogen treatments were slaughtered in December, when they obtained higher carcass prices than the control group slaughtered in October. Liveweight gain per acre totalled 640 and 650 lb at the 6 and 12 cwt levels of fertilizer application, compared with 424 lb per acre in the control group.

Legumes suppressed by nitrogen application

The high liveweight returns made in 1956 in the ryegrass experiment showed the good response to be obtained from the use of nitrogen in a grass/clover sward *low in clover*. The low clover content (less than 10 per cent)

was due to dry weather: the same result is commonly produced by high dressings of nitrogenous fertilizer.[2] Alder[3] found a marked depression in yield of lucerne under a lenient cutting treatment, following repeated annual dressings of 4 cwt per acre of "Nitro-Chalk".

On grass/clover swards, a management allowing frequent grazing in spring can be used to reduce, to some extent, the competitive effect of grass on clover. In lucerne mixtures, the effect of competition is reduced if grass and lucerne are separated by wide spacing at sowing, to give both species greater access to light and moisture. This is the basis of new methods of sowing and managing grass and lucerne which have already been used with success.[4]

Nitrogen on lucerne/cocksfoot swards

An experiment using lucerne and cocksfoot was sown in 1955 to investigate the results of such spacing under continual grazing, at two levels of nitrogen fertilizer application. Two methods of sowing were used for comparison:

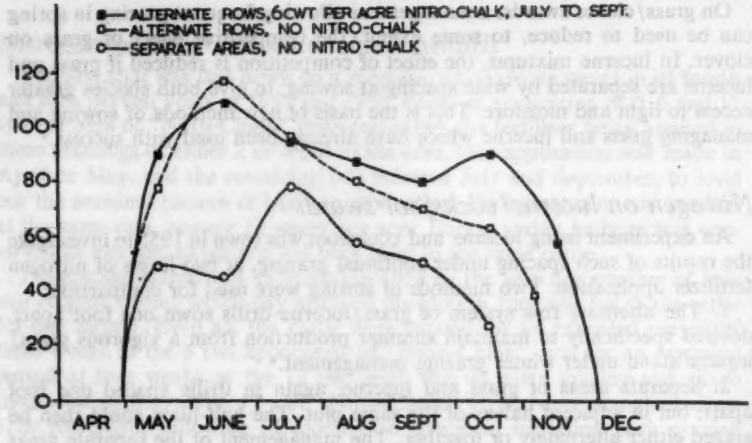
1. The alternate row system of grass/lucerne drills sown one foot apart, devised specifically to maintain summer production from a vigorous grass/legume stand under winter grazing management.[4]

2. Separate areas of grass and lucerne, again in drills spaced one foot apart, but in adjacent halves of the same plot. The half-plots could then be grazed either alternately or together. The management of the separate areas allowed for rest periods of five to eight weeks for the lucerne, and for the application of nitrogenous fertilizer to the grass half of the plot.

In this way, the vigour of lucerne growing in alternate rows with cocksfoot, and its contribution of nitrogen to the production of the cocksfoot, could be assessed with and without heavy dressings of nitrogen. It could also be compared with the vigour of pure stands of lucerne grazed in conjunction with grass receiving the same quantities of fertilizer nitrogen but offering no competition to the lucerne. In the fertilized treatments, "Nitro-Chalk" was applied at the rate of 6 cwt an acre in two or three dressings during July, August and September. In the *separate* plots receiving fertilizer, the same total quantity was applied to the grass half of the plot, which thus received 12 cwt per acre. In this experiment, again, the emphasis was placed on extended autumn fattening of two-year-old Hereford cross-bred cattle. These were allotted, at a rate of one per acre in each year, to each of the four treatments, and were rotationally grazed over the plots from the end of April to slaughter (when no further grazing was available). In the first harvest year, herbage in excess of grazing requirements was cut for silage. In subsequent years, extra cattle were introduced to maintain the desired rate of grazing rotation. This resulted in a stocking rate of 2–2½ per acre from May to September on the treatments producing most herbage.

The results show that with lucerne and cocksfoot sown in alternate drills, high nitrogen dressings can be used in late summer in a grazing unit with no detriment to the vigour of the lucerne. Furthermore, the summer production obtained from the alternate drills was far higher than the production from the two species sown separately, where nitrogen from the lucerne was not available to the grass. The periods of rest needed by the lucerne half-plot meant that the grass half had to be grazed alternately with it, and only at one grazing out of four could the two be grazed together to make possible a

transfer of nitrogen through the animal from lucerne to grass. The seasonal patterns of yields are shown (below) in a graph of grazing days per acre per month on three of the experimental treatments in 1957.



Grazing days per acre per month (lucerne and cocksfoot)

High production was attained in May, June and July from alternate rows without fertilizer. High yields of pure lucerne at this time in the separate plots were counterbalanced by very low cocksfoot production in the adjacent half of the plot, where neither legume nor fertilizer nitrogen was added. Production from the alternate rows continued to be higher throughout the season than in the separate plots receiving no fertilizer nitrogen. Late summer nitrogen was effective in the alternate rows in raising the yields of grass so that prolonged grazing was possible into early winter.

December pasturing

The result of this pattern of production, where both the legume in early summer and nitrogenous fertilizer in late summer were contributing to high yields of forage, was to extend the carrying capacity of the pasture well into December. Three weeks' longer grazing were obtained on the alternate rows than on the separate plots, both without fertilizer, together with an extra 89 lb per acre of liveweight gain over the season as a whole. The application of "Nitro-Chalk" to the alternate rows gave a further three weeks' grazing and an additional 74 lb liveweight gain per acre over the season. Thus in 1957, the alternate row treatment receiving 6 cwt per acre of "Nitro-Chalk" gave a total of 623 lb liveweight gain per acre, and the date of slaughter was delayed to 4th December. These results confirmed those of 1956, when an extension of grazing of four weeks was obtained from the application of "Nitro-Chalk" but the difference between separate and alternate row treatments was less marked at the lower stocking rate.

Three years of treatment, 1956–58, have shown the flexibility of the alter-

nate row grass/lucerne ley for grazing. Three rotations in 1956 and four rotational grazings in 1957 and 1958 have been taken, giving rests of five or six weeks, lengthening to eight weeks before the final grazing. Lucerne in alternate rows with cocksfoot has remained as vigorous following three years of application of "Nitro-Chalk" at 6 cwt per acre as in the plots receiving no "Nitro-Chalk". In the separate plots, the third harvest year has seen a rapid invasion of the pure lucerne areas by weed grasses. Only three grazings of lucerne were obtained from these separate plots in 1958, which reduced the period of grazing compared with the alternate rows.

Liveweight gains per head over equal periods of time have been slightly higher on plots receiving nitrogen. This may be due to the higher proportion of grass in the diet, since other experiments[5] have shown that lucerne alone gave lower liveweight gains per head in yearling cattle than when grown with varying proportions of cocksfoot. However, the contribution made by the lucerne to soil nitrogen and thence to the vigour of the grass grown in association with it (see the graph) clearly has considerable value.

Value of extended autumn grazing

Although an extension of grazing time has been demonstrated, both from the association in alternate drills of lucerne and cocksfoot, and from the use of nitrogen top dressings on these and on ryegrass/white clover swards, it is pertinent to assess the value of this extra time at pasture. A reduction of indoor hand-feeding can mean less cost of feed and labour, but for the beef animal further advantages are obtained. On ryegrass in 1956, liveweight gains continued at 1½ to 2 lb per day throughout November and December in two-year-old Hereford cross-bred cattle going to slaughter at weights ranging from 9 to 11 cwt. These gains were exceptionally high, and on lucerne/cocksfoot, gain per day was more normally ¾ to 1 lb in November. Lower rates of gain are to be expected when more careful rationing of standing herbage is practised in autumn, since not only is the grass relatively mature, but pasture growth is slow and the intake of nutrients tends to be reduced.

The greater financial benefit to be gained by extending the grazing of these fattening cattle into early winter results chiefly from rising prices at this time. An extension of grazing for a month for one beast per acre under such a price structure may well more than repay the cost of 6 cwt nitrogenous fertilizer per acre. Grading results in these experiments have been higher, on an average, at the later dates of slaughter. In a total of 72 cattle in the experiments described, carcass grades were 49 per cent grade A, 44 per cent B and 7 per cent C from swards receiving nitrogen, as compared with 23 per cent grade A, 64 per cent B and 13 per cent C in the control groups.

A useful extension of the slaughter of young beef cattle into early winter can be achieved following continual controlled rotational grazing at a stocking rate of one to two beasts per acre, from the combined use of legume and fertilizer nitrogen. Where a grass/clover ley is heavily top dressed to this end, clover may be depleted and production reduced in the following year. Leys due to be ploughed could be used for the purpose, so avoiding the reduction of sward vigour in the following season. The alternate row system of sowing grass and lucerne offers a grazing ley in which each species can

produce high yields, without suffering serious competition, even where high nitrogen applications are given to encourage grass growth in late summer. There has been no bloat on the alternate drills during these experiments. The high proportion of grass taken in with the lucerne, and the fairly mature stage of growth obtained with rests of five to eight weeks, both help to reduce the bloat risk. Alternate drills are sown at a seed rate of approximately 5 lb per acre for each species, using a tractor-mounted vegetable seed drill. More ingenuity is required when using corn drills, but it is well repaid when high production from both legume and fertilizer nitrogen is wanted.

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Animal Health in Great Britain, 1957

The comprehensive Report on the Animal Health Services in Great Britain for 1957 has recently been published, together with a short statutory Return of Proceedings under the Diseases of Animals Act, 1950, for the year 1958.* The latter publication gives a summary of the incidence of animal diseases and related matter for 1958, and it will be followed, later in the year, by a full report, including the work of the laboratory research and investigation services.

Outbreaks of foot-and-mouth disease rose from 162 in 1956 to 184 in 1957 and dropped to 116 in 1958: the incidence of anthrax, after an exceptionally high figure in 1956, fell considerably in 1957 and still further in 1958: outbreaks of swine fever rose in 1957 and again in 1958: the number of outbreaks of fowl pest increased slightly in 1957, but decreased again in 1958. It is now expected that the whole of Great Britain will be clear of bovine tuberculosis by the end of 1960 or early in 1961.

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* Report on the Animal Health Services in Great Britain, 1957. 6*s.* (6*s.* 5*d.* by post). Return of Proceedings under the Diseases of Animals Act, 1950 for the year 1958. 9*d.* (11*d.* by post). Both publications obtainable from any Government Bookshop or by post from H.M. Stationery Office.

Lamb Wintering Sheds

L. J. WILLIAMS, A.R.I.C.S.

Agricultural Land Service, Aberystwyth

Interest in lamb wintering sheds is increasing. This article explains why, and is a valuable guide to the principles which should be considered before a shed is built.

MANY farmers and landowners think lamb wintering sheds are a modern novelty, but records show that they were in use well over a hundred years ago. In the early days a few flockmasters experimented with wintering their lambs indoors in sheds floored with gravel, ash, straw or bracken, with varying results; but it would be fair to assume that many difficulties were encountered, due mainly to diseases of the feet. Another problem was that little thought was given to ventilation in the buildings then used, which were mainly of brick or local stone, with roofs of slate or tiles. When lambs were housed in the sheds for long periods the atmosphere became hot and stuffy, so that when they were let out for foraging and water during inclement weather the difference between the atmosphere inside and outside caused both management and health problems. For these reasons, therefore, together with the fact that few farmers had buildings to spare, the practice of inwintering lambs never became popular.

While these few pioneer hill farmers were experimenting with inwintering, the majority were adopting the practice of wintering their lambs away with the lowland farmers—a custom which has stood the test of time. It became known in some parts of the country as "putting the lambs out to tack", and proved very successful to both parties, payment being made at so much per head. Naturally prices have fluctuated considerably during the years, but in many hill farming districts the old custom of paying for the away-wintering of the lambs with the money received from the wool crop of the main flock still exists. This financial criterion decided how many lambs would be sent away for wintering, and it is interesting to find that in many cases the hill farmer has paid for his away-wintering exactly the same amount as he received for his wool crop.

The lowland farmer also had a system based on a financial criterion. He paid his rent with the money received for wintering the lambs, and this governed to some extent the number he would take. As implied earlier, this system worked very well, both sides being happy with the arrangement, but some scheme had to be thought out if a lamb died while away on "tack". This was overcome by the lowland farmer removing both ears of the lamb, which carried the flock marks, and sending them to the upland man as "proof of death".

In post-war years, however, this arrangement of away-wintering has become rather unbalanced, because the lowland farmer has intensified his milk production and, consequently, is reluctant to lose his early bite of grass. Because of this he is becoming less and less interested in taking sheep for the winter, and it is becoming extremely difficult for the hill farmer to find someone prepared to take his lambs. Consequently many hill farmers

are looking to lamb wintering sheds with increasing interest and, in fact, many have erected them with very satisfactory results.

One point of controversy is that lambs housed in the sheds are not so hardy as those sent away to the lowlands for the winter, but this assumption can be refuted quite strongly. Experience has proved that the lambs are as hardy as, if not hardier than, those wintered away in the accustomed manner. Another important feature which should not be lost sight of is that the lambs wintered in the sheds become accustomed to eating hay, which is a considerable asset if emergency feeding becomes necessary later on in their lives.

Siting the sheds

It would be wrong to lay down too many rules and regulations about siting lamb wintering sheds; each case must be considered on its merits, bearing in mind altitude, access, flock numbers, prevailing winds, etc. It would be imprudent, nevertheless, not to mention a few factors which ought to be considered when selecting a site. One should consider accessibility. If the shed can be near a road, this will obviously reduce both the initial erection and future transport costs.

A site which is exposed to prevailing winds should be avoided, as wind and rain increase maintenance costs, besides making the building draughty. Finding a sheltered site on a mountain area is not always easy, but the problem may be overcome by erecting shelter-belts.

It should be borne in mind that when the lambs are let out for foraging during the day, usually from mid-morning to mid-afternoon, they need a good supply of water, as none is provided in the shed. Consequently, the site should be near either a natural or a piped water supply.

These are some of the main items which have to be considered, but there are many others, for example the provision of electricity. Although this is not absolutely essential, it would be of considerable advantage, particularly if the shed is used for shearing or such other enterprises as poultry or turkey rearing during the summer.

General construction

One of the first things to remember when considering construction is that lamb wintering sheds are usually sited well up in the mountains where the incidence of rain and wind is high, a condition which always increases maintenance work. Furthermore, contractors are reluctant to take work in isolated areas, and if they do, have to be paid for the inevitable time spent in travelling to and from such places. With this in mind, it is even more important than usual to use materials which need little or no maintenance.

Another important factor is that these sheds are primarily intended to keep the lambs out of the driving rain or snow, not to keep them warm. In fact, they are much more satisfactory if the construction is such as to keep the inside of the building as nearly as possible at the outside temperature and, unlike most modern stock buildings, the question of insulation and loss of heat does not arise. On the detailed construction of the buildings, there is a difference of opinion as to what is the most satisfactory. Some

sheds converted from existing buildings of various types of construction have proved quite satisfactory, and this alone shows that it would be wrong to lay down any hard and fast rules. However, if new sheds are to be erected, the lower four feet of the walls should be constructed of brick or concrete blocks. Bricks should be set in cement mortar in the proportion of 1 part cement to 4 parts clean sand. If blocks are used, the mortar should be of 1 part cement, 2 parts lime and 9 parts sand, all measured by bulk and not by weight.

Above these solid walls, the cladding should be of treated galvanized iron or asbestos, which can be fixed with hook bolts to steel framing or nailed direct to timber.

The roof may be of asbestos or similar maintenance-free material, laid with a good end lap, and with a side lap laid in the direction of the wind to prevent it blowing under the sheets and damaging the whole roof.

The size of the shed will, of course, depend on flock numbers, and more will be said about this in a later paragraph, but the building should be tall and airy, to avoid causing a stuffy atmosphere. The height to eaves from finished floor level should not be less than ten feet. Incidentally, all wood should be treated with preservative, either under pressure or by the hot and cold tank method.

Slatted floors over concrete

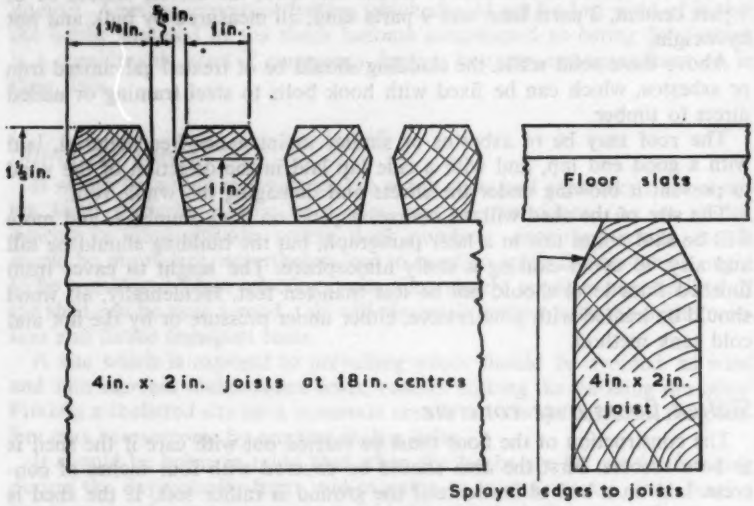
The construction of the floor must be carried out with care if the shed is to be a success. First the area should be covered with four inches of concrete, laid on a bed of hardcore if the ground is rather soft. If the shed is to be used solely for wintering, with no prospects of being put to any other use, the concrete need only be about two inches thick. Its purpose is to keep the water and dampness down and prevent vegetation growing under the slatted floor. In fact, it may in some cases be dispensed with altogether and the area covered with a thick layer of fine stone dust or ash. On top of this concrete slab or other sub-floor, precast concrete piers about 12–18 inches high should be set to carry 6×4-inch timber beams at intervals of about 8 feet. These beams are the main supports for the slatted floors, which should be formed in sections of about 8×4 feet, a convenient size for two men to handle.

The floors are constructed of shaped softwood slats, laid with a space of $\frac{3}{4}$ inch between and nailed to 4×2-inch splayed joists. The purpose of the splay on both the slats and the joists is to allow dung to fall through to the space below, and thus not foul the lambs' feet. When constructing these floors, remember that the slats must be laid parallel to the entrance doors, so that from the eye level of the lambs when they enter the building the floor appears to be solid. If they are laid the other way, the lambs see the gaps between the slats and hang back.

The advantage of having the slatted floor in sections and the beams and piers removable is two-fold. The whole floor structure can be lifted out for easy cleaning, and the building can be used for other purposes if, for one reason or another, the practice of inwintering the lambs is discontinued.

One pair of sliding doors 8 feet wide is all that is necessary as an entrance to the building. Some existing sheds have more than this, but the provision

of doors always increases both the initial and maintenance costs and, unless great care is taken in their construction, they tend to make the sheds draughty. Ramps up to the doors will be necessary. These, like the floors, should be of slats nailed to timber bearers and so constructed as to be removable if the building is required for some other use.



Details of softwood floor slats

Lighting and ventilation

It is necessary to provide only sufficient light to facilitate feeding. Natural lighting can be provided either by windows in the walls or by transparent roof sheeting, which has the advantage of reducing maintenance costs. One window about 4×2 feet to each 15-feet run of wall or roof should be enough. Artificial lighting is not essential but, if electricity is available, it is recommended. It is useful for carrying out an inspection of the flock after dark, and increases the adaptability of the shed for other purposes. The amount depends on personal opinion, but one 150-watt lamp to each 15-feet length of building should be adequate.

Ventilation is of great importance: adequate unobstructed inlet and outlet ventilation must be provided. At the same time it is equally important to avoid draughts, and for this reason all inlets should be above the heads of the lambs. A position about 3 feet below the eaves is considered the most suitable, and one ventilator 4×2 feet to each 15-feet length of wall is recommended, with outlets of equal area set well up in the roof.

Although the people at present wintering their lambs in sheds agree on many things, they seem to have a diversity of opinion on the most satisfactory allowance of floor area for each lamb. The general opinion is that it need only be relatively small, provided, of course, that there is ample ventilation to prevent the atmosphere becoming hot and stuffy. For lambs of

the Welsh Mountain breed, 4½ sq. feet per head is satisfactory, but for rather heavier breeds, such as the Swaledale, an allowance of 5 sq. feet is recommended, and the Scotch Blackface would need about 5½ sq. feet.

Feeding arrangements

When some of the existing sheds were first erected, the feeding racks were placed along the outer walls of the building in accordance with the accepted practice in livestock buildings, but this proved to be unsatisfactory. It is interesting to see how the lambs tend to lie against the outer walls after eating and thus possibly block the feeding space for the others. This tendency follows their natural instinct to lie under a hedge or embankment to obtain protection from the weather. It seems, therefore, that the most satisfactory position for the feeding racks is along the centre of the building. It is sometimes necessary to run two racks along the length of the building; in such a case they should not be less than seven feet apart.

Iron or wooden portable racks are reasonably satisfactory, but they do involve expenditure and take up valuable floor space, thereby reducing the capacity of the building. In some cases, feeding racks have been made of pig wire netting, bent to a U shape and slung from the roof members, high enough to allow a lamb to walk underneath. It has been stated on occasions that the pig netting is inclined to break the lambs' teeth, but there is no evidence to support this claim. Racks made from pig netting are, of course, suitable for hay, but if concentrates are being fed this can be done in small portable pig-troughs on the floor.

As with floor space allowance, there are different opinions on how much hay rack and trough space is necessary, but generally it can be assumed that a length of between 12 and 15 inches per lamb is satisfactory.

As wintering sheds are usually erected as off-lying buildings, some storage accommodation should be provided for hay and concentrates. It has been suggested that the traditional loft would be the right answer, but lofts tend to make the buildings too hot and are therefore not recommended. The best solution to the problem would seem to be an additional bay; one 15-feet bay of a 24-feet span building should hold enough baled hay for 400 lambs for the wintering season and leave a little space for a few bags of concentrates.

Costs

The cost of erection will depend on many things, such as site level, access, availability of contractors, and locality, and each case should be considered on its merits. A shed for 400 lambs recently erected in a typical mountain area cost approximately £1,500, which included a small hay store and drainage. This shows a unit cost of about £3 15*s*. per lamb. It cannot be over-emphasized, however, that this is given purely as a guide: the actual cost of any particular shed could be 25–30 per cent higher or lower.

The increasing popularity of these sheds suggests that the economics must be right, and the following example is self-explanatory. Note that a grant of one-third of the cost under the Farm Improvement Scheme was obtained —£500 out of a total estimated cost of £1,500. In most cases, however a shed would be eligible for a 50 per cent grant under the Hill Farming and Livestock Rearing Acts and the saving would, therefore, be much greater.

Balance Sheet

	£		£
Cost of away-wintering 400 ewe lambs @ 32*s.* 6*d.* per head	650	Cost of ¼ lb hay per head per day for 3½ months, @ £12 a ton	112
		Cost of 3 tons concentrates	90
		Cost of labour, 1½ hours a day for 3½ months	35
		Depreciation and maintenance @ 10 per cent a year	100
		NET SAVING FOR YEAR	313
	650		650

The balance sheet includes an annual allowance for return of capital outlay (depreciation) and maintenance amounting to £100, leaving a net saving per year of £313. But another way of looking at it is to regard the £100 and the £313 together as a return of 41 per cent on the net cost of £1,000. The £413 might be treated as being available for increased rent or return of capital outlay in addition to profit.

This article covers most of the basic principles which must be looked into when considering the erection of a lamb wintering shed, but it cannot answer all the questions which must arise in one's mind. It should, therefore, be taken only as a guide: fortunately, we have pioneers in this particular field among us and can gain from their experience. A trip to someone who is already working the system would be time very well spent.

The photographs on p. iv of the art inset were taken on Captain Bennett Evans' farm at Llangurig.

Profile

Arthur S. Rickwood, M.B.E., J.P.

P. E. Cross, N.D.H.

Arthur Rickwood has a long and proud record of work in the public service. It is all the more remarkable, therefore, that he has also found it possible to farm to a high degree of perfection some 8,668 acres of land in the Isle of Ely, Cambridgeshire, Norfolk and Suffolk. Each year he sends to the maltings, mills and markets approximately 60,000 tons of farm and market-garden produce, excluding livestock. Jokingly called the "Carrot King" by the late King George VI, he is probably the largest grower of this crop in Europe, with some 2,500 acres and an annual production exceeding 30,000 tons. Besides carrots he grows 3,000 acres of cereals, mostly wheat and barley, 900 acres of potatoes, 900 acres of sugar beet, considerable acreages of parsnips, Brussels sprouts and celery, and smaller areas of mustard, lucerne and cabbage. The rest of his land is cropped with a variety of market-garden and farm cash crops, together with grass and fodder crops

for livestock. Some crop producers in the Eastern Region have been accused of farming down to the bare minimum of soil fertility, but Arthur Rickwood's system is the very antithesis of exploitation; the fertility of the land under his management has improved immeasurably and its cropping response doubled or trebled.

A great horse-lover, he has watched with a genuine tinge of sadness the eclipse of the draught-horse. His regret is not unnatural when one considers the good work he has done in the past on behalf of the Percheron Horse Society, of which he was president in 1948–49. In that year he had 199 working horses, now they are down to 20 in number; however, he has shown Percherons continuously since 1945 and won two supreme championships, one reserve supreme, and first prize for a team of four at R.A.S.E. shows. There are still, he says, many jobs among potatoes and roots which the horse can do just as well as the tractor, but horsemen are not forthcoming.

Seven hundred store beasts are his chief source of F.Y.M. in bulk. They are mostly fattened in yards during the winter months, their diet being largely supplemented with hay, straw and tillage crop residues. For bought-in stores, Mr. Rickwood still prefers the Hereford or Angus crosses with Friesians, Shorthorns or Lincoln Reds, though he has modified his buying and feeding programme to meet the changed demands of the trade for a smaller carcass. Probably his greatest achievement in the livestock world was the establishment of the Heathbarn herd of Large Whites, some twenty years ago. The annual sale at The Laurels, Mepal, in the Fens, is now well established in the calendar of the pig-farming year, and is a joy to all who attend. There is also the attraction of seeing one of the most modern fully-mechanized fattening units in East Anglia, with a designed throughput of 1,000 head a year. Altogether, Mr. Rickwood delivers over 5,000 pigs of bacon weight to the factories annually.

He keeps a breeding herd of 450 sows and gilts, together with 20 boars. Practically all his breeding stock are maintained on the Norfolk and Suffolk farms, from which over 5,000 weaners are distributed to the fattening units on his farms elsewhere. The litter average is in the region of 8·72. At the 1952 Mepal sale, which had been postponed because of an outbreak of foot-and-mouth disease in Cambridgeshire, the litters, all bedded into wicker hampers, provided an astonishing and welcome diversion from watching a long presentation of gilts, all very much alike and of high quality.

Early days

He was born of yeoman Fen stock, and practice and craftsmanship in the field were to be his early school of learning. Soon after leaving school in the early years of the century, he and his brother Charles became partners in the hire of two one-acre allotments near Chatteris, where they were born and brought up. Setting to after Michaelmas, they worked the plots and sowed carrots in the spring. With this crop profitably marketed, they embarked on the seasonal hire of odd fields for cropping with vegetable roots and potatoes. This practice was not uncommon in the days when the weed hazard was such that some farmers were glad to hire odd dirty fields to itinerant root-crop growers, who invariably returned them in clean and fertile condition ready for the drilling of winter wheat.

Arthur Rickwood still remembers how he and his brother called each other at 3 a.m. so that they could get forward with their work. In the growing and marketing season their day invariably continued until late in the evening. Such was their spirit of enterprise that an 80-year-old horseman, still hale and hearty, recently described to me how, when the Rickwoods engaged him as a horseman lifting roots, they would pay him an extra shilling if he would stay on after other workers had gone home, to plough out additional rows of potatoes and roots which the brothers could clean, bag and load for market before nightfall put a stop to work for the day. Indeed, Arthur Rickwood is the embodiment of that spirit of endeavour so typical of a pioneer group of Fen farmers who, following improvements to arterial drainage, were to transform the face of the Fenland in fifty years. Arthur Rickwood, the Headings, the Bedfords, the Mortons, the Deptfords and the Hartleys, all rising from yeoman stock, have a record to be proud of.

The rich black fens around Chatteris have a long history of root-crop production. Fodder roots were grown in large quantities for a hundred years or more for sale to the stablers of horses in London and the Midland towns. As this trade declined with the development of motor traction and the coming of sugar beet, so the production of vegetable roots for human consumption was stepped up.

Work in partnership was disrupted at the outbreak of the first world war when Arthur was called up for military service. Resuming the partnership in 1919, the brothers gradually increased their enterprise, until by 1929 they were well established, and the partnership was given up and the business and land divided between them.

Expansion

After a period of consolidation, Arthur, now on his own, hired Fortrey Hall Farm, comprising some 435 acres of rich black fen, in 1932. It is on this farm that the major part of Wright's experiments on the control of carrot fly have been carried out over a great many years.

Shortly afterwards he made his first excursion outside the Fens and took over 343 acres of light, stony land at Pickenham in Norfolk. This was followed by the Risby Farms in West Suffolk, totalling 877 acres, in 1938. Returning to the Fens in 1940, he acquired the Feltwell Fen Farms in Norfolk, of 1,018 acres. In 1950, Manor Fen Farm, Feltwell, on a very light peaty soil, was bought. A seam of blue buttery clay on the boundary of this land has since been excavated and used to clay the larger portion of the land near by. The results were immediate and lasting—Hybrid 46 and Koga II wheats yielding well over 2 tons per acre wherever they are grown. The additional acreage brought the Feltwell Fen Farms to 1,275 acres.

Smaller acquisitions in the Fens, totalling 492 acres, were added in 1941; in the same year the 409-acre Kennett Farms in Cambridgeshire were rented, and purchased about ten years later. The National Sugar Beet Harvesting Trials were held here in 1957, Arthur Rickwood providing some 120 acres of beet in one block, all serviced by hard farm roads, with facilities for car parks and trade stands. Perhaps the greatest move in his career was the creation of his tenancy of what are known as the Southacre Farms in Norfolk. These comprise some 3,800 acres of coarse, sandy loam, which has proved ideal for

the production of carrots, potatoes, sugar beet, barley and Brussels sprouts. In 1953 he provided a magnificent site for the Royal Norfolk Show at Narford, by seeding down some 75 acres of land for the Show Committee.

The Southacre and Risby Farms carry most of the Heathbarn herd's breeding stock of Large Whites. Two of Mr. Rickwood's carrot washing and grading machines, each powered by a 22 h.p. diesel engine, can be found on the Southacre farms. The rated capacity of each of these units is 30 tons a day, but it is not unusual during periods of market pressure for the two units to wash and bag over 100 tons of carrots, parsnips and white turnips in one working day, including overtime. In all, six washers of this type are operated on the various farms, and on occasions over 200 tons of carrots are washed and bagged in one day and sent to market by his own and other transport. Indeed, more than 900 tons of washed roots have sometimes been sent to the markets in the course of a week, and throughout the autumn, loads usually average 250–300 tons of produce a day.

Arthur's last acquisition, in 1955, was Blunts Farm, of 413 acres close to Chatteris, famous as the site of the *Farmers Weekly* "Wings versus Wheels" Potato Spraying Trials in 1957 and 1958. Here, Mr. Rickwood provided upwards of 100 acres of King Edwards for the experiments, as well as seeding down 18 acres with S.22 Italian ryegrass for an aircraft landing field and car park. He is no slave to any form of strict rotation. Avoiding what is obviously wrong, he keeps his cropping plans fluid and open. Thus he has been able to switch his crops to whichever farm provides the best sowing or planting conditions at the time. Over and again this has proved to be very sound practice, particularly in extremely wet or dry seasons.

Labour organization and relations

Arthur Rickwood's labour force of some 630 permanent and casual workers is also largely mobile, and each season it is formed into work units to suit the job in hand, and carried from farm to farm as required. During the spell of sharp weather early last January, 250 workers were drafted into one field from which it was possible to lift carrots in spite of the frost. Labour organization presents no problems, and the volume and cleanliness of the crops grown attract those skilled workers who are anxious to earn good money at piece-work rates.

The nerve centre of this vast farming enterprise is at Victoria House, Chatteris, where in a modern office a total of six executives and clerks conduct all the clerical business connected with the various farm units, transport depots and stores. Working managers on the larger farms, and foremen on the smaller units, maintain effective liaison with Mr. Rickwood and his office staff at Chatteris. However distant they may be, they are never allowed to feel they are out of contact with "The Guv'nor". The whole enterprise breathes as one, and herein lies the secret of its success.

Activities in the public service

Some measure of the man and his organizing ability can be gathered from a review of his activities in the public service. He has been a member of his County Council for 31 years, its vice-chairman for four years and chairman

for another four, besides being chairman of many of its sub-committees. In addition, he has been a member of Chatteris U.D.C. for 34 years, holding the offices of chairman and vice-chairman during this period.

His service with the C.A.E.C. has been continuous since 1939, and he has held the chairmanship since 1957. He is also chairman of the Agricultural Development Section of the Executive. His long co-operation with the Ministry's Advisory Services and with specialized workers from our Regional and National Research Stations has added much to our knowledge on both fen and normal farming problems.

An interest in drainage is shown by his membership of three internal drainage boards in the Fens, whilst in N.F.U. circles he has been a member of the county branch for 39 years and was its chairman from 1942–45. At present he is chairman of its pigs committee. His knowledge of the mechanization of cash crops was such that he served as a member of Lord Radnor's Agricultural Machinery Development Board.

In concluding this article, I would be failing in my duty if I did not highlight what Arthur Rickwood firmly believes to be the main reasons for any success he has attained. Firstly, he is a firm believer in the goodness and bounty of his Maker. A keen supporter of his Church throughout his life, Arthur Rickwood has given more than the ordinary man's concept of a Christian's duty to the Church and his fellow men. He is a governor of Cheshunt Theological College, Cambridge, and is a past chairman of the Cambridgeshire Congregational Union. His secretaryship of the Chatteris Congregational Church dates continuously since 1919. He is also trustee and leader of his little Union Church at Mepal, an office in which he takes a particular pride.

In his family life he has been blessed with wonderful happiness in the company of his serene and gracious wife, and their three daughters. To say that Mrs. Rickwood has been a source of inspiration and encouragement to him is an understatement, for without her many virtues, her patience in particular and her calm unruffled management of her family affairs, Arthur Rickwood could not have undertaken such a vast amount of public work as well as the management of his many business enterprises.

The C.L.A. Game Fair, 1959

Following the success of last year's Game Fair at Stetchworth, Newmarket, in July, the Country Landowners' Association have decided to hold another on Friday and Saturday, July 24th and 25th, at Hackwood Park, near Basingstoke. Features of this year's Game Fair will be advice and demonstrations on managing game birds on a small shoot, clay pigeon shooting, casting competitions for salmon and trout fishermen, a small bore rifle range, gundog tests, and displays of archery and falconry, with a venison barbecue on the second evening. Admission 5*s.* Friday and Saturday morning; 2*s.* 6*d.* after 2 p.m. Saturday.

Alternative Horticultural Crops for Cornwall: 1

F. W. SHEPHERD, N.D.H.(HONS.)

Director, Rosewarne Experimental Horticulture Station

Why are anemones, daffodils, broccoli, spring cabbages and early potatoes the main horticultural crops in Cornwall? Can any others be grown at a profit? In this article Mr. Shepherd concentrates on vegetables: next month he will discuss flower crops.

FROM time to time, those concerned with horticultural production in this south-western peninsula are asked, "Are there no additional crops which would reduce the reliance on a few, and add to the prosperity and productiveness of the farms and market gardens in the county?"

This question has been studied at Rosewarne by both thought and discussion, and by trying to grow some of the possible crops on the station. Such work has necessarily been supplementary to the intensive work on the five main crops of the district, namely anemones, daffodils, winter cauliflower (broccoli), spring cabbages and early potatoes. These are grown fairly generally in the south-west of England, but some of them are particularly concentrated in the most favourable areas; daffodils in the Isles of Scilly and the earliest potatoes around Mount's Bay, for instance.

These important crops are all grown for the large urban markets of Britain, and supplies far exceed the needs of the comparatively small local population. Many other crops are grown to meet local demands, with perhaps some surplus sent to the nearer primary markets, and a few more are grown in small quantities for the distant markets. Pittosporum, violets, and early annual and biennial flowers are all produced in sufficient quantities to meet the limited demand. Any crop to be added to this short list would have to be grown for the same distant markets if any extensive area were to be planted. There is, of course, some return trade in which different horticultural crops are brought into the South-west from other districts specializing in them. Apples and pears from most of the important orcharding districts, and vegetables preserved by freezing, canning and drying, are examples of this trade.

What factors have brought about this pattern of production? Are any changes taking place which would allow present crops to be developed or new ones to be introduced? These questions are examined below.

Climate

The climate of any district has an overriding control of horticultural production, for while it is possible to grow any crop almost anywhere, the methods necessary to do this may be entirely uneconomic. The Devon and Cornwall peninsula is not only well surrounded by the sea but is further south than the rest of the country, except the Channel Islands. The length of daylight in the winter is therefore greater than further north, and is not unduly reduced by fogs, of which the area is remarkably free during the winter

months. The winters also are mild but not frost-free, and the spring comes earlier than in most other parts of the country. In general, therefore, crops maturing in the winter can be grown, but no tender plants, which would be killed by frost, can be attempted. Spring crops tend also to be earlier, but weeds continue to grow and seed almost unchecked throughout the year.

Once the spring has come to other districts, however, the temperatures there tend to be higher, and the peninsula has lower summer temperatures than most other districts in which horticulture is important. In general the rainfall is higher than in all other horticultural areas, and the higher humidity provides conditions in which many crops are more likely to be attacked by fungus diseases.

The most serious factor limiting growth is probably the wind. Not only does this persist, and thus tend to lower the temperature, but there are also more or less frequent severe gales which can devastate some crops and damage nearly all others. Shelter is therefore all-important for any horticulture attempted in the area. Sites naturally sheltered by hills are preferable, but even there additional shelter may be necessary in one quarter or another.

The distances to all the main markets are very considerable. It is, for example, some 200 miles from Penzance to Bristol and 300 to London. Not only, therefore, is the cost of transport considerable but the distances increase the risk of damage during the long journeys.

In considering the possibilities of additional crops for any holding, thought must always be given to the way in which the necessary cultivations and marketing will fit into the existing pattern of work. In most circumstances it will be uneconomic to add fresh work at certain times of the year to a holding which already has a balanced programme of work and an adequate labour force. New crops replace something less remunerative; and they must either provide work in periods of under-employment for the staff—and this will include all necessary work on the crop—or, alone or with others must provide paying work for one or more workers throughout the year. Exception to this would be allowed only when adequate reliable casual labour was available for the busy periods. Even when an extra crop can be fitted into a holding's scheme of work, the matter of the knowledge of its production by the management, and skill in handling by the workers, must also be taken into consideration.

Generally, holdings and individual fields are small, particularly the market gardens which have been developed in the sheltered valleys and on southerly slopes. Much of the earliest and most suitable horticultural land is sloping, often very steeply. Large-scale production is difficult and the mechanization of any work far from easy; costs of production therefore tend to be high. Apart from the obvious personal problems, the enlargement of fields or holdings is extremely difficult since small areas of suitable and unsuitable land may be close to each other, and the natural and artificial shelter often forming the boundaries of small fields must not be removed if horticulture is to continue.

Possible crops: top fruit

The horticultural industry in England as a whole is extremely diverse, including as it does fruit growing on trees, bushes or canes, the production

of a wide range of vegetables and salads in the open and under glass, and the cultivation of extremely varied types of flowers, flowering and other ornamental plants for cutting or for temporary or permanent decoration.

Among the top fruit, a few plums are grown in Cornwall in the sheltered valley between Falmouth and Truro, and apples and cherries are to be found, partially as shelter-plants for bulbs and anemones, in the Tamar Valley. But it seems very unlikely that any modern varieties of apples, pears, cherries or plums could be produced economically in the area. Apart from wind damage, the heavy rainfall and high humidity make disease control extremely difficult. Mild autumns tend to allow leaves to remain on the trees far too long, and thus prevent proper ripening of the wood and buds.

Cane fruit

Ripe gooseberries, currants, raspberries and other cane fruit all need warm, dry conditions for harvesting, and long journeys even of dry fruit are bound to reduce their quality. With the exception of black currants, some varieties of which stand a certain amount of wind, all can be completely ruined by gales. There is only a very short period when early green gooseberries make a good price and the demand for this crop is falling rapidly. Even where sheltered sites allow reasonable growth of the bushes, control of weeds and disease is most difficult and costly; the crop appears to be slightly later in west than east Cornwall.

There is really no other fruit which can be grown out of doors in this country and sold in any quantity, so that the production in Cornwall of any fruit except the strawberry is unlikely to yield a satisfactory result.

Strawberries

Strawberries in west Cornwall are moderately early, but apparently no earlier than in the Tamar Valley and the other early districts. Put them under cloches, however, and they are earlier than the same varieties treated similarly elsewhere. If a graph of prices for this crop for the past few years is studied it will be seen that high prices are obtained in mid to late April. These drop gradually until early June, when outdoor crops appear in most early districts, and then the price drops to one-tenth or less of the first ones. It is possible, therefore, that the earlier fruit might pay for the extra cost of transport and that, picked at the correct stage of development and well packed, it could travel sufficiently well to compete with fruit from other districts in this country and abroad. The type of covering is important, for it has been shown at Rosewarne that cloches with closely-fitting glass admitting the minimum of cold air and rain may be as much as ten days earlier than less satisfactory types.

The strawberry crop is, however, a specialist one, requiring attention as to planting in August or September, when bulbs should be planted and anemones weeded. It is susceptible to several virus diseases, and new stock plants to produce runners early enough for planting are probably needed each year. The glass with which they are covered is in use on the crop from late January or early February to the end of May. This leaves little chance

of using it economically for many other crops. Picking can be a laborious task, spread over some two and a half months of the year. It is possible, however, that those with sheltered smallholdings, with fertile land, a moderately low pH and a willingness to use low glass coverings might find this crop a useful one.

Vegetables

Many vegetables are bulky, heavy and of comparatively low value, both per ton and per acre. They can only be grown economically comparatively near to the consumer. Broccoli and spring cabbage are among the most important green vegetable crops, and Cornwall is alone in providing a regular supply of the former from November to April. Summer, autumn and winter cabbage and savoys can be grown equally cheaply near the markets, and the cost of transport makes them uneconomical in general in the South-west. Brussels sprouts suffer much too severely from ringspot disease to be capable of producing a satisfactory crop in Cornwall; those which are grown tend to mature in the autumn and early winter and have finished by the time severe weather in other parts has made supplies scarce and expensive to pick. A very late, ringspot-resistant variety might be of limited value to Cornwall. Summer cauliflowers to follow the broccoli are produced as cheaply in other parts of England as in Cornwall, and brassica mildew can be a serious disease on the overwintering seedlings in the South-west, while heavy rains in the spring often delay plantings as much as cold weather may do elsewhere.

Root vegetables are generally too heavy to transport far, and with the important exception of early potatoes none is likely to be economical in Cornwall. Early carrots, turnips and beet for bunching may be slightly ahead of those elsewhere, and further study of the two former in particular may yield promising results. The demand is tending to lessen, however, with the development of quick freezing and other means of preservation, and in any case it is limited to quite a short period every spring.

Among the legumes there is a great slackening in demand for early peas, and in wet and windy conditions overwintering of the earliest varieties is far from satisfactory. Growth is by no means as rapid in the cooler late springs in Cornwall as it is in other parts.

Early runner beans, however, are entirely dependent on the date of sowing, and this is governed by the date of the last frost. It does seem possible to sow earlier in the west, either in the open or, preferably, under cloches, and thus to produce a crop when prices are remunerative. This is usually from late June to early August, when large quantities of outdoor beans appear from many parts of the country. By that time it is not usually worth sending from a long distance, so that quite dwarf sticks, strings or wire are all that is necessary to produce good quality pods during the first five or six weeks of the productive life of the plant. So far dwarf or french beans have not proved as successful as runners.

Broad beans have an even shorter season of reasonable returns, but if they are sown in late October or November there is usually a reasonable chance of picking in late May or early June, to coincide with the early demand at paying prices. Wind and wet, the occasional frost on soft seedlings, and such

pests as mice and rooks are snags which must be faced with this crop during the winter.

Of the remaining vegetables, onions appear to need an even drier climate than the driest part of Britain. With a far greater rainfall and cooler summers, Cornwall cannot attempt to ripen them economically. Green onions have great difficulty in competing with the continuous weed growth, but the modern weed-killers might assist in this direction. Leeks tend to go to seed far earlier in Cornwall than elsewhere, and would be past their best by the time this crop is usually making the better prices. Self-blanching celery can be raised reasonably early with the aid of glass for seed sowing, and very early if the seedlings can be planted in frames. The crop is, however, heavy and thus expensive in carriage. It is also, even in the west, in need of irrigation in most seasons and it is doubtful if such equipment could be justified for celery alone.

Most of the vegetables not yet mentioned are wanted in only small quantities on the market, and whilst some of them might be tried in restricted areas, very careful exploration of the potential market would be necessary before an expansion took place. Asparagus, for example, can be slightly earlier in Cornwall than elsewhere and, with modern herbicides to overcome the serious weed problem, might be worth further study. There appears to be an increasing demand for sweet corn, although it must have shelter, for wind not only damages the plants but reduces pollination by blowing away the pollen, and thus produces irregular cobs.

Salads

The salads appear to be in demand for a greater part of each year than hitherto, but most of them need the protection of glass in one form or another for out-of-season production. Certainly outdoor tomatoes cannot be grown economically in the heavy rainfall and cool summer in Cornwall. The Channel Island of Jersey seems to be the only part of the British Isles where this crop is successfully grown outside, and there the summers are warmer and drier than in Cornwall. Glasshouse production has not been greatly developed in Cornwall, and it is unlikely that present-day costs of erection will allow very much building to take place. Where houses exist, however, and the staff have the skill, earlier crops might be considered. With shelter from the wind, the milder winters should make the cost of winter heating less than in other parts of the country. The length of daylight is greater at the critical period when seedlings are being raised, and these two advantages might outweigh the extra cost of transport to the distant markets.

Lettuce meets a varying demand throughout the year. At most periods outdoor crops, which in Cornwall are often battered by wind and rain, would not compete favourably with crops grown near the markets. So far the most successful lettuce at Rosewarne have been those sown in frames in October, pricked out in December and marketed in March and April. Some varieties are far too susceptible to downy mildew (*Bremia lactucae*) in the conditions obtaining, and present experience suggests that Gotte à Forcer is among the best for this purpose. The South-west does not appear to have any advantages over other districts for the remaining salads such as cucumber, radish, mustard and cress and so on.

Making the most of Electric Fencing

C. LINE, B.SC.
National Institute for Research in Dairying

MECHANIZATION and work studies are helping to keep labour costs within bounds, and at the same time enabling workers to earn a better standard of living. But few farmers today can afford more than a minimum of extra labour to deal with incidental jobs. Electric fencing offers a quick way of controlling livestock without a great deal of labour or much cost. Because labour is expensive, there is perhaps a tendency to take less care in the control of feeding, on the ground that the extra labour required will offset the value of the food saved. The increasing popularity of self-fed silage is an expression of this thinking. The same reason could be advanced for not using labour to control grazing but much waste could result, particularly with present-day trends towards larger fields to facilitate mechanization.

Uncontrolled grazing leads to undergrazing, which is all too common. Uneaten pasture becomes progressively less palatable, and this build-up of unpalatable herbage through the season tends to cut down the milk yields by reducing the amount of food the animal is willing to gather. The cow can then be induced to eat enough to maintain milk production only by increased feeding of concentrates.

Recent research suggests a simple way in which electric fencing could increase pasture utilization with little daily effort and no harm to the cow. Daily folding, compared with good rotational grazing where the cows are moved frequently (say, once or twice a week), does not increase production from either the cow or the pasture, provided stocking rates are kept the same. When moved to a fresh paddock, rotationally-grazed animals overfeed, but if they are kept on short rations for a day or two they will eat a larger proportion of the herbage without yielding less milk overall. Where strip-folding is considered too laborious, rotational grazing offers an attractive alternative. Pastures can be split up by electric fencing into a series of paddocks, each of which will feed the milking herd for about a week. Once the fencing has been set up early in the year, it can be left in position throughout the season, needing next to no labour during busy times. If daily folding is desired when growth is strong, previous sub-division will make this a simple task. As the fencing does not have to be moved frequently, the more expensive portable equipment is not needed. Wooden stakes, nail-on insulators and wire will cover most requirements. Careful planning of the paddocks will enable tractor work to be done without much impediment, the ideal being to have paddocks the full length of the field.

Integration of grazing and silage-making operations then becomes a practical possibility. If desired, part of the field can be ensiled while another area is grazed, instead of grazing until the last moment and cutting for silage when the hay stage has been reached. Electric fencing makes control of the herd around the farm easy, and offers opportunity for high utilization and hence fuller use of the grazing crops. Efficiency of the farm is enhanced by increasing herd numbers or devoting a greater acreage to cash crops.

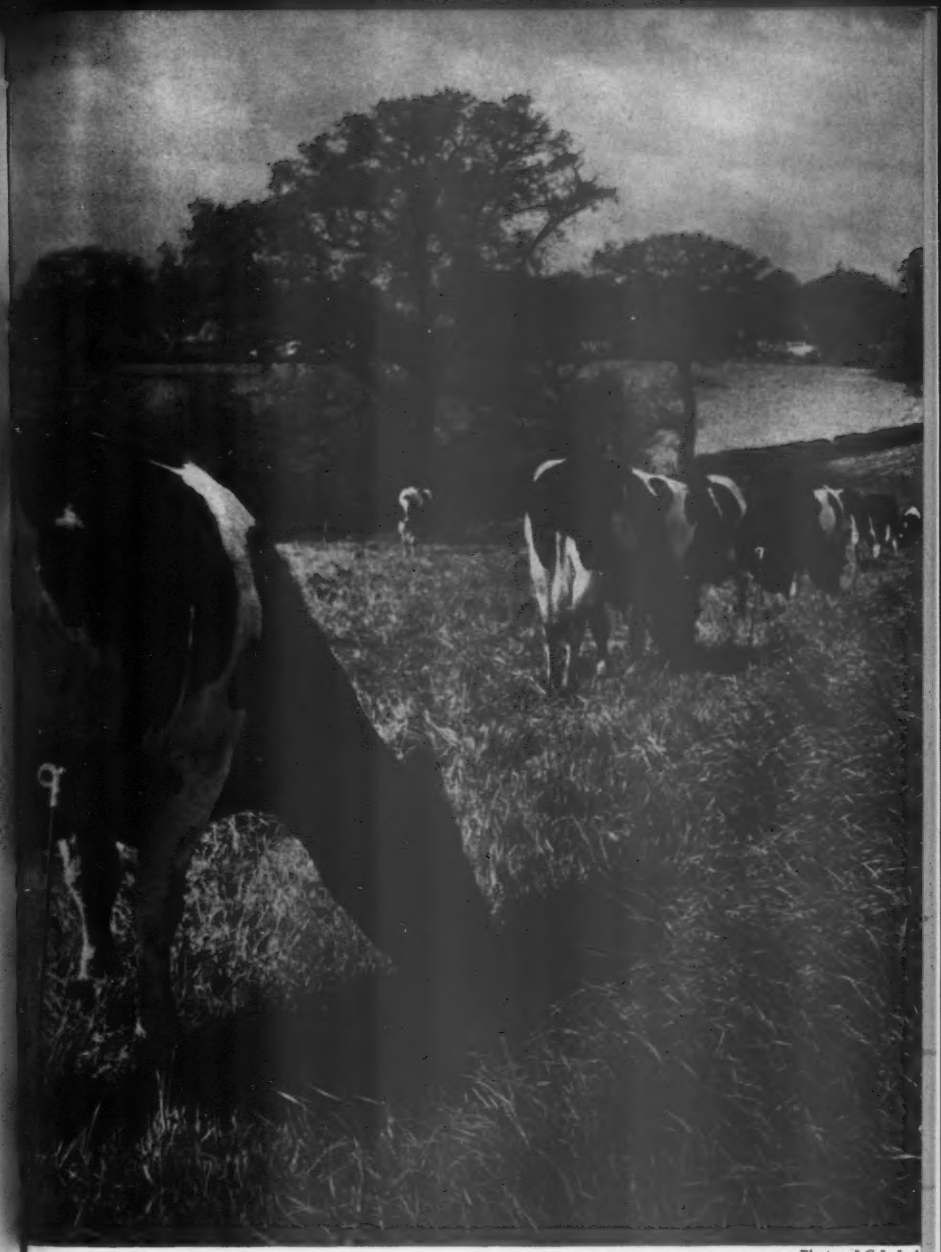


Photo: *I.C.I. Ltd.*

Electric fencing can prevent undergrazing cheaply and without much labour.

Photo: *Joan Gardiner*

Arthur S. Rickwood, M.B.E., J.P.

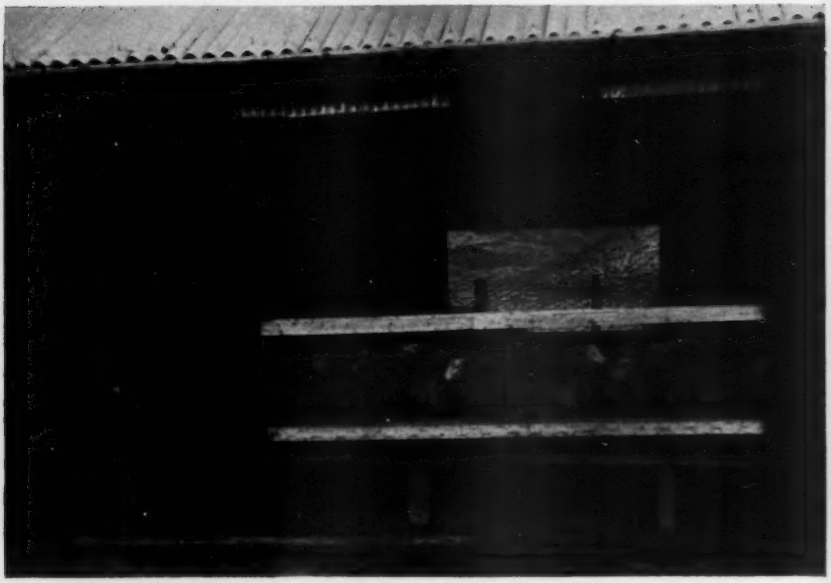
(Article on pp. 70–4)

On Mr. Rickwood's Dane Hill Farm, Kennett

Mr. Rickwood examining an early crop of Craigs Royal potatoes which is being lifted; and *below* with Mr. David Black (centre) discussing baconers from his famous pedigree Large White herd.

Photos: *Bruce*

Lamb Wintering Sheds (Article on pp. 65–70)



This view through the open doors shows how the floor is raised on concrete piers.

A closer view of the slatted floor. The wire-netting feeding rack is hung from the roof, taking up no floor space.

Clean Prepacked Potatoes

P. T. G. TWISS, B.SC.(AGRIC.)

Ditton Laboratory, Department of Scientific and Industrial Research

Mr. Twiss reports experimental work on the effects of washing or dry brushing, and of packaging, on the shelf life of mature, maincrop potatoes in this country during the winter and spring months.

DURING the past two or three years there has been a remarkable increase in the quantity of potatoes marketed in small unit packs; some 6,000 tons are now sold in this way, each week, throughout the winter months. Most of them are dry brushed before packing, but an increasing proportion are now being washed before being packed as this improves the appearance and sales appeal of the packs, and also makes diseased or blemished tubers easier to find. There is doubt, however, about the effect of washing on the keeping quality of potatoes and the necessity or otherwise of drying after washing.

Washing potatoes before sale is common in the United States. As a result of experimental work at the U.S. Sub-tropical Experiment Station at Homestead, Florida, drying by artificial heat is widely accepted as essential in the Southern States; in New England, however, and the Northern States generally, drying by means of sponge rubber rollers is usually considered adequate. But American experience may not be a guide to desirable practice in this country because of the great differences in climate and methods of handling between the American continent and the British Isles.

To obtain information about the effects of washing English potatoes, and to identify the factors limiting their storage life in unit retail packs which remained free from bacterial soft rot, a short series of controlled experiments was planned for the winter and spring of the 1957–58 packing season. In the event, only two large-scale experiments with washed potatoes were carried out as losses from bacterial soft rot proved to be so much less than had been expected. A third experiment was made with dry brushed potatoes to see if the same factors were limiting storage life as in the case of washed tubers.

First experiment with washed potatoes

In the first experiment, carried out during February 1958, 45 cwt of white potatoes (half riddled and half not) were washed with various degrees of efficiency (defined in terms of the amount of soil remaining after washing), and then packed while still wet. Four hundred pounds were put into 5 lb perforated polythene packs (12 × ¼-inch holes) which were carried in triple-wall kraft paper sacks with a centre ply of wet-strength paper; the rest were put in 1 cwt light-weight jute sacks. Unwashed potatoes, both in unit packs and jute sacks, were included in the experiment as a check on the keeping quality of the bulk stock. Two commercial washing machines were used, and three degrees of washing efficiency tested. Potatoes from the soak tank of the first

machine were very imperfectly washed, but potatoes from the bagging head were fairly clean, although patches of stiff clay still adhered to them. Potatoes from the bagging head of the second machine were perfectly clean but slightly skinned. Both machines used recirculated water from large settling tanks, at a temperature of 48°F and a pressure of 55 lb per sq. inch. After washing, the potatoes were loaded on to an open lorry and carried about 220 miles, the journey taking ten hours. The load was covered with a tarpaulin sheet; a maximum/minimum thermometer beneath the sheet recorded 52°/46°F at the end of the journey. After the journey, the potatoes were stored under normal potato warehouse conditions. A preliminary examination was made twenty-four hours after washing and further examinations were made on the second, fourth, sixth, and eighth days.

Effects of incomplete washing

The examinations suggested that under the conditions of the experiment, the efficiency of washing—that is to say the amount of soil left adhering to the tubers—affected keeping quality as much as, or more than, the speed of drying. Active soft rotting of the potatoes washed least efficiently (those packed after immersion in the soak tank) was apparent in the jute sacks after two days and in the polythene packs after four; by the eighth day, all of these were a total loss. Potatoes packed from the bagging head of the first machine were less affected by soft rot, but 20 per cent were a total loss after eight days. None of the potatoes washed quite free of soil (those from the bagging head of the second machine) was affected by bacterial rotting. The unwashed potatoes—with the exception of some in jute sacks which had received drainage from sacks above them while on the lorry—remained sound throughout the period of the experiment. The affected potatoes rotted very rapidly and were a total loss by the fourth day.

The amount of soil which stuck to the tubers after washing also had an effect on the rate of drying; this was more apparent in the 1 cwt jute sacks than in the 5 lb polythene packs. Potatoes washed free of soil and packed in jute sacks dried completely in just over two days; those less efficiently washed took two days longer to dry. Potatoes in the polythene packs kept in paper outers were still damp after eight days, whether they had been washed free of soil or not.

Saprophytic fungi grew strongly in the polythene packs, particularly those containing much soil, possibly because of the high humidity. No dry rot developed in any lot, riddled or otherwise; there was no sign of blight infection.

The appearance of the least efficiently washed potatoes was surprisingly good, and equal to that of many stocks on the market at that time. Unwashed potatoes in polythene packs were, however, of very poor appearance, at first because of damp soil pasting on the pack walls and later because of loose soil and dust in the pack. No greening was apparent in the polythene packs retained in paper outers; in the jute sacks it was noticeable in the case of the washed potatoes after two days, and was severe in the outer layers after four. There was some opening of the eyes in all the samples, but no appreciable sprout growth on any of the tubers during the period of the experiment.

Second experiment

The second experiment with washed potatoes was carried out during April 1958, with an imported Dutch table stock. Some 6 cwt of potatoes from each of four sampling points on a commercial packing line were put into 5 lb perforated polythene packs (12 × ¼-inch holes), placed in double-wall kraft paper outers with an inner ply of wet-strength paper. The samples were taken from the soak tank, from the outlet of the washing machine, from the exit of the sponge rubber roller type drying machine, and from the output of the semi-automatic bagging machine. A sample of unwashed potatoes was taken as a check on the keeping quality of the bulk stock. The washing machine used water from the mains at a temperature of 52°F and a pressure of 65 lb per sq. inch. After washing, the potatoes were loaded on to an open lorry and transported about 65 miles, the journey taking three hours. As in the first experiment, the load was covered with a tarpaulin sheet; a maximum/minimum thermometer placed beneath the sheet recorded 62°/51°F when the potatoes were unloaded the following morning. Thereafter the potatoes were stored under normal potato warehouse conditions.

No rot, but sprout growth

The tubers were examined at weekly intervals for a month after packing. At the time of packing, the potatoes from the soak tank and from the exit of the washer were wet; those from the exit of the drying machine and from the bagging heads were damp, but without a visible film of moisture. At the time of the first examination, however, the latter were dry and the former only slightly damp. At all subsequent examinations the potatoes from all the sampling points were found to be absolutely dry and free from deterioration of any kind. This was an unexpected result, particularly in so far as potatoes from the soak tank were concerned, and may be explained by the fact that the potatoes dried very quickly as a result of being packed in absorbent light-weight paper outer sacks and kept in warm surroundings. (The absolute maximum temperature in the warehouse was 73·0°F, the mean maximum 63.9°F, and the mean minimum 50.0°F during the course of the experiment.)

Slight sprout growth was apparent at the first examination, and increased week by week until at the final examination the sprouts averaged ¾ inch in length on all tubers. This was sufficient to make the packs unsaleable. In all other respects the appearance was excellent, and the potatoes could have been sold readily after one month's storage if only they had been free of sprout growth. Many of the packs had a very slight film of moisture on the inside, but some observers even considered that it gave an illusion of freshness which enhanced the appearance.

The skin of these imported potatoes might not have been carrying the appreciable bacterial flora which is invariably present on the skin of home-grown potatoes; this would have accounted for the absence of bacterial soft rotting in the experiment. As it was not possible to examine the tubers by the usual bacteriological techniques, a practical test was carried out. Some of the potatoes were kept wet for several days: massive bacterial soft rotting followed, and they became a total loss within seven days.

Experiment with dry brushed potatoes

In an experiment carried out with white potatoes, between the same dates in April 1958 as the second washing experiment, 360 lb of potatoes from the untreated bulk stock, and from each of three sampling points on a commercial packing line, were put into 5 lb perforated (12 × ¼-inch holes) polythene packs carried in double-wall kraft paper outers. The line samples were taken from the exit of the reciprocating type grading machine, the exit of the brushing machine, and from the output of the semi-automatic bagging machine. The potatoes were kept overnight in the packing house and then loaded on to an open lorry and taken about 65 miles in three hours. The maximum/minimum thermometer placed under the tarpaulin covering the load recorded 62°/51°F when the potatoes were unloaded next morning. Thereafter, the potatoes were stored under normal potato warehouse conditions.

They were first examined nine days after packing and then at weekly intervals for a month. At the first examination, sprouts averaged ¼ inch long on all tubers, with some sprouts ¾ inch in length. After one month's storage, sprouts in different packs averaged 1½–3 inches in length, with individual sprouts as much as 4 inches long. The amount of sprout growth was sufficient to destroy the sales appeal of the packs at the time of the first examination; it is even doubtful whether they could have been sold on a dull market after seven days' storage. There was a fairly strong growth of saprophytic fungi and obvious moisture inside those packs of potatoes which had not been over the brusher and which, for that reason, included more soil; there were no fungi and only slight amounts of moisture inside the packs of potatoes which had been brushed. The brusher used in the experiment was very effective and there was virtually no soil at all left on the tubers which had been brushed; at the same time, the potatoes were neither as clean nor as attractive in appearance as washed potatoes. The incidence of pathogenic wet or dry rots was negligible throughout the experiment.

Mechanical damage

It was observed at the first examination that a few tubers from all the sampling points were showing internal discoloration of the type associated with bruising injury (and potash deficiency) and known as "blue-spot". This enabled a very useful assessment to be made of the degree of roughness with which each of the machines in the production line was handling the potatoes, although the overall treatment was not sufficiently severe for there to be any visible external injury such as skinning or cracking. During the thirty days of the experiment, the amount of blue-spot in the untreated stock increased from less than 10 per cent to 27.9. (The exact incidence of blue-spot at the time of the first examination is not known, as only a few tubers were cut then.) This increase in blue-spot so reduced the accuracy of comparisons at the later dates that the effect of individual machines was masked. At the second examination, made fifteen days after packing, and the first occasion on which every individual tuber was cut, 11.4 per cent of the untreated tubers showed internal discoloration. This could be attributed to the handling the potatoes received before they reached the packing house. The

sample taken after grading showed 22.5 per cent, that taken after grading and brushing 25.6 per cent, and that following grading, brushing, and bagging 35 per cent. The increase due to the grader and that due to the bagging operation were highly significant ($P=0.01$) but the apparent increase due to the brusher was not significant ($P=>0.5$). In other words, the brusher used in the experiment caused little damage to the potatoes, but the semi-automatic bagging machine and reciprocating grader both caused damage—the latter increasing the incidence of blue-spot by 11.0 per cent and the former by 9.0 per cent (Standard Error ± 1.3 per cent).

Outcome of the experiments

In these experiments, the necessity or otherwise for drying mature, main-crop potatoes after washing under commercial conditions during the winter and spring appeared to depend largely upon the efficiency of washing. It would seem that if potatoes are not dried completely after washing and before packing, washing must be carried out in such a way that all traces of soil and soil-laden water are removed from the tubers.

In one of the experiments in the early spring, the use of recirculated water without a final rinse did not result in soft rotting, probably because the settling tanks used for the recirculated water were very large and the weather was cold. Commercial operators might be well advised to use an ample rinse of fresh water on potatoes which have either been washed in a machine using recirculated water or rolled in a drum immersed in a tank of water. Even with this precaution, it may be bad practice to pack potatoes while they are still wet, and a wise precaution is to dry them to the point when an actual film of water is no longer visible and the tubers are no more than damp. This standard of dryness can be achieved satisfactorily by a machine using sponge rubber or plastic as an absorbent, so long as the machine is in good order and is operated at the appropriate capacity rate. If these criteria are not met, or the potatoes are not washed clean, then the use of artificial heat to achieve complete dryness may be essential.

Many soft rots were initiated in old growth or wound cracks which retained soil and moisture: tubers with such cracks are better graded out of the sample from a sales point of view, and their removal is essential if artificial heat is not used for complete drying.

The storage life of packs which were not affected by soft rot was found to be limited by sprout growth, and this was particularly marked in the case of the dry-brushed potatoes. Storage life could no doubt be considerably extended if sprout growth in the packs were controlled. This might be achieved as in America by applying a sprout suppressant in a water/wax emulsion.

All the types of pack used in the trials were satisfactory provided the conditions of storage and handling were also acceptable. Potatoes washed and packed in 1 cwt light-weight jute sacks deteriorated no more than similar potatoes in perforated polythene unit packs. In a subsequent small-scale test, kraft paper sacks were also found to be suitable as containers for washed potatoes which were not in unit packs but loose. The use of kraft paper sacks rather than jute also reduced greening. There may well be a market for loose, washed potatoes at a price lower than that prevail-

ing for potatoes in unit packs; and commercial packers or farmers who may think of meeting it should remember that, as washing increases liability to greening, even greater care than usual should be taken to avoid unnecessary exposure to light.

Acknowledgment is made of facilities or materials freely afforded by K.F.F. (Packers) Ltd., of Farnham, Surrey; by Messrs. A. P. Tice and Sons Ltd., of Runfold, Surrey; by the Produce Prepackaging Development Association Ltd., of Knightsbridge, London; and by the Director of the Experimental Horticulture Station, Cawood, Yorkshire.

The work described in this paper was carried out as part of the programme of the Food Investigation Organization of the Department of Scientific and Industrial Research.

Fatal Accidents in Agriculture, 1958 England and Wales

MACHINERY	
Tractors	
(a) Overturned	30(1)
(b) Overturned—Silage heaps	3
(c) Falls from	10
(d) Various	10(2)
Implements and machines (including self-propelled)	
(a) Power take-off shaft	1
(b) Various	9(1)
Fixed and portable machinery (including power tools)	4(1)
Lorries and cars	1
Electricity	4
	72(5)
HAND TOOLS	1
ANIMALS	
Bulls	2
Other	6
	8
BLOWS AND WOUNDS	10(1)
FALLS	
From ladders, steps, stairways	2
From platforms, ricks, stacks	1
From vehicles and trailers	4
From other heights	1
Other falls	2
	10
OTHER CAUSES	
Diseases and poisons	1
Burns and scalds (not involving machinery)	2
MISCELLANEOUS	
(a) Gunshot	2
(b) Lightning	2
(c) Others	1(1)
	8(1)
TOTAL	109(7)

NOTE: Fatal accidents to children under 15 years old are in brackets and included in totals.

The U.S.A. Revisited

PROFESSOR A. N. DUCKHAM, C.B.E., M.A.
University of Reading

A summary of the major changes seen by Professor Duckham in American farming since 1950.

LAST summer I made a short return visit to North America, which I had travelled widely between 1945 and 1950, and on which I reported in 1952.[1] After this absence of eight years, the most notable changes in the agricultural scene were four. First, the persistence of a high level of production despite the continuance of a rapid drift of manpower from the land. Second, the growth of "contract farming" and other structural changes in the agricultural economy. Third, the ever-increasing mechanization of livestock farming, and in particular the interest in zero grazing. Fourth, the spread of sprinkler irrigation—a subject in which, as a result of the work at our Sonning Farm, we in the Department of Agriculture at the University of Reading are greatly interested.[2]

Since 1920, the area under crops in the U.S.A. has remained around 400 million acres. New acreage added by the growth of irrigation, drainage schemes and land clearance has been more or less offset by land that has been abandoned because of soil erosion, or because it has become submarginal. But the coming of the tractor has in the past forty years released for crop production some 80 million acres previously needed to feed horses and mules. It is this factor, coupled with the great technological advances of the past twenty years, that has enabled American farmers to produce enough to meet the rapidly growing domestic demand for food.[3] For not only is the human population of 165 millions half as great again as it was about 1920, but the rising standard of living has steadily shifted demand to meat, fruit, vegetables and other foods which call for the greater use of agricultural resources.

Despite this great rise in domestic consumption, the United States has for many years been exporting the produce of 40–50 million acres of crop land and has, as we all know, a chronic embarrassment of agricultural surpluses.

Although this high and rising level of production has, of course, been stimulated by various price support devices, farming has not been a profitable occupation and there has been, especially in recent years, a dramatic fall in the number of people working on farms. This is now 45 per cent less than it was in 1920. The net effect of all these changes has been to treble output per man within a generation. These trends—larger population, rising consumption standards, higher agricultural productivity per acre and per man—are likely to continue as far ahead as one can see.

Sidewalk, suitcase and integrated farming

It is not surprising that a technical and social revolution of this order is having major effects on the structure of the industry. These changes have, it

seems, become more pronounced in the last decade; they were perhaps somewhat masked during the war and immediate post-war period.

The most noticeable feature is the rise in the number of abandoned farms. In the north-eastern states much marginal land has gone out of production, particularly in upland areas of poor soils where the terrain was too rough or the farms too small for easy mechanization. Further, many occupied holdings in this region are merely "hobby" farms, or provide a little extra interest and income to those members of the family who work as wage-earners in a factory which may be twenty or twenty-five miles away.[4]

In the cereal-growing Great Plains, farmhouses are often empty, even though the adjoining land is still cropped or grazed. The coming of the combine, and other machines which can work many tens of acres per day, have increased the economic farm size. Farms have been amalgamated to make "one-man" units of anything up to 1,200 or so acres; half of this may be in cereal, the other half in fallow.

Even a farm of this size provides only part-time occupation, for extensive cereal growing is highly seasonal. A few hectic weeks at drilling time in the spring, and a few equally hectic weeks at harvest time, and the rest of the year is your own—unless you happen to have some land for livestock ranching as well. This helps to explain the rise of the "sidewalk" farmer, who has a business or a job in town within 200 miles or so and "camps out" on his farm for drilling and harvest. Compared with the prairie farmer with no other interests, such men can better afford the risks of crop failure which are only too frequent in many of the drier parts of the Great Plains.

Another way of spreading the risk of crop failure, making better use of the capital tied up in equipment, and at the same time reducing seasonal unemployment is to become a "suitcase" farmer. He is a man who, for instance, grows winter wheat in Texas and spring wheat in North Dakota, which lies further to the north and where the season is later and shorter. Another type of "suitcase" farmer grows maincrop potatoes in Aroostook County, Maine, and then moves his family, his caravan and his machinery 2,000 or so miles south to Florida to take a crop of first earlies. In the genial winter climate of the deep south, he can do this and be back in Maine by the time the snow-melt makes field work possible once again.

But perhaps the most interesting recent development has been the growth of "contract" or "vertically integrated" farming. A contract farmer is one who shares some of his managerial decisions and risks in production and marketing with one or more related businesses such as his feed merchant, sugar beet factory, or egg packing station.

This kind of vertical integration has long been familiar to us with sugar beet, with vegetables and fruit for canning and freezing, and in a mild way with milk. But in the United States it has gone much further and spread to more commodities. Thus sugar beet and sugar cane, dried peas and beans, vegetables for canning and freezing, pineapples, citrus fruits, cotton, seed maize, vegetable seeds and many specialized crops are mainly or entirely grown on contract, or they may be contracted to be marketed to a specified processor. The contracting business may supply the farmer with feed, fertilizer, labour, credit, advice and instructions, according to the product and locality. For example, one sugar company in Colorado supplies gang labour

for thinning, but also requires each grower to use a down-the-row thinner so as to make the crop less dependent on expensive casual labour.

Contracting has gone furthest with broilers, 95 per cent of which are produced "on some type of integrated basis". The farmer provides the broiler-house, equipment and labour. The contractor furnishes the birds, feed, fuel, litter, chicks, vaccine, etc., and carries most of the market risk. In return, the farmer may get a fee of, say, 2 cents (just under 2*d*.) per pound of broiler sold, or a flat fee of 5 cents a bird.

The farmers' organizations are getting alarmed by the growth of contract farming; it seems, at first sight, to rob the producer of his way of life and to permit his economic exploitation. It does, however, bring capital, specialization, highly efficient business methods and first-class advice on to the farm. So long as the farmer is not too deeply committed to one line, he gains security without losing his freedom, particularly if he contracts with a producers' co-operative in which he can have some say.

Materials handling and livestock

The continuing drift from the land means that there are today many more one-man livestock farms than there were fifteen or twenty years ago. This puts the accent on contract services—which are in a way another kind of vertical integration—for artificial insemination, grinding and mixing feeds, cleaning out and disinfecting pig-houses, as well as for field work which requires expensive machines or cannot easily be done single handed. At the same time, the single-handed man becomes keen to save himself time and avoid dull routine and hard or messy work in looking after livestock. Hence the current upsurge in livestock mechanization, which the Americans have carried much further than we have. Our rising labour costs and the difficulty of getting men to do messy or smelly jobs suggest that we could learn a good deal from the United States, both about work and method study and materials handling.

During my visit I noted several interesting developments. Though the Americans do not seem yet to have found less work-consuming methods than we have for making clamp or pit silage, the use of polythene covers was noticeable. These not only help to keep the clamp free of rain during and after making, but are said also to reduce aeration and hence loss of carbohydrates by excessive fermentation. Despite its high initial cost and the difficulty of keeping a tearable polythene seal airtight, this aid seems worth investigation. So does another self-sealing device, the airtight tower silo with a valve at the top that lets out carbon dioxide as internal pressure rises, but prevents replacement air, and hence oxygen, getting in.

There are many contrivances for handling silage from the tower or clamp. Several remove the silage from the bottom of the tower by auger, or from the top by a surface scraper, and then feed it to a trough which circles the silo. Others depend on conveyor systems—endless chains, or rather belts, or manure scrapers—to spread silage and other feed along the troughs. Power shovels worked by drag-line winches and large cribs mounted on four wheels were also seen. The latter were filled at the silo and towed to the stock in yard or field.

Various types of portable fence for self-feeding clamp silage were noticed.

Some of these have platforms for the cattle to feed at, or faces which incline towards the cattle, as this is said to reduce the tendency to eat from the top only. Useful modifications noted were a creep for outdoor calves grazing with other stock, and an octagonal crib which could be filled with silage or hay by one load of a fore-loader.

On beef-producing holdings, the tendency is to mix chopped hay, silage, grain, protein concentrate, and stilboestrol together and feed this to the troughs, either through an enclosed pipe system operated by augers or suction, or by various open conveyor systems. Alternatively the ingredients are fed in layers—using a fore-loader or overhead chute—into a self-unloading trailer which mixes them as it discharges, sideways, into the continuous manger or trough. Where, as on most small farms, such mechanized feeding was not practised, there were at least attempts to make work easier, such as the use of shovel-scoops on wheels and, of course, various ways and means of moving dung from stanchion-type dairy barns. Despite the trend towards parlour milking these orthodox barns are still popular in a cold long winter, and various types of mechanized gutter cleaners were seen, mostly of the rubber or plastic conveyor belt or endless chain types.

It is, of course, easy to exaggerate the degree to which mechanized materials handling has been applied to livestock in the U.S.A. But it is clear that it is very much on the mind of the livestock farmer who, like other Americans, is attracted by the slogan "Don't move it unless you must, and if you must, do it by machine, not muscle". It is symptomatic that there is in Chicago a very lively "Barn Cleaner, Cattle Feeder and Silo Unloader Association", which actively promotes mechanization of livestock.

Irrigation

The Americans seem to have been less successful in saving labour in irrigation, especially sprinkler irrigation, although labour cost is one of the factors limiting the spread of irrigation in the U.S.A. It is true that I saw many devices which aimed to reduce the labour of moving pipes and sprinklers. Many of them, however, seemed clumsy, and certainly had high capital costs. The available gadgets fall into three main classes. First, skids or trolleys of various kinds for making it easier to move orthodox pipes and sprinklers by hand or tractor. Second, self-propelling systems, in which the pipes and sprinklers are mounted on very large wheels that a separate power unit moves slowly forward. Third, large towers or rotating booms festooned with sprinklers which irrigate a large area at each stand, and so need moving less frequently. Nevertheless, with the growing American interest in sprinkler irrigation, there is bound, sooner or later, to be a labour-saving breakthrough, so it is well worth keeping an eye on American developments in this field.

The American interest in sprinkler irrigation springs from the same source as ours—a realization that in so-called humid climates crops may often suffer a moisture deficiency. As a result, in most of the eastern states south of New York City one can find sprinkler systems at work on market-garden crops, on maize for corn on the cob and on pastures. Grazing experiments in the eastern and southern states of Maryland, Virginia and Tennessee tend to confirm its value for pastures where summer evapo-transpiration is likely

substantially to exceed summer rainfall. The Soil and Water Conservation Service of the United States Department of Agriculture have worked out district by district water-need schedules to guide farmers in the planning and day-to-day use of their irrigation equipment.

These trends will continue

A return visit, after eight years away from America, led me to these conclusions. First, that the technological revolution in the United States is as rapid as ours and, like ours, shows no sign of slowing down. Although men will continue to leave the land, total production will continue to increase—partly because the farmers who expand by taking over the vacated farms are usually younger and more progressive than those who sell out. Despite a rising population with a higher standard of living, America is likely to have food surpluses to export for many years to come.

Second, the obvious economic and technical advantages of vertically integrated contract farming will outweigh any social disadvantages. This kind of farming, and also "sidewalk", "suitcase" and other types of part-time or multiple farming, will go on increasing.

Third, the rising size of farms, the declining labour force and the growing consumer demand for animal products will speed up the mechanization of livestock production, particularly in handling feed and dung.

Finally, sprinkler and also flood irrigation will go on developing. The speed of this growth will be partly, even largely, determined by the success the Americans achieve in finding cheap and simple methods of reducing the time and motion now wasted in moving irrigation pipes and sprinklers, and in looking after flood irrigation systems. Sooner rather than later the American farmers are, however, going to be short of irrigation water, and here the current research in California and elsewhere on removing the salt from sea water is likely, in the long run, to yield important dividends.

My thanks are due to Mr. O. G. Williams, Agricultural Attaché, British Embassy, Washington, and to others who supplied information and ideas.

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4th June Agricultural Census

When you receive your June return, please fill it in quickly and post it back to the Ministry—within seven days.

Feeding Silage from Traditional Buildings

A. M. SALKIELD, N.D.A.

National Agricultural Advisory Service, Herefordshire

A Herefordshire farmer's solution to the problem of self-feeding groups of steers of different ages.

IT is often difficult to place a silo where it will make self-feeding possible and at the same time cater for stock of different ages—especially on larger farms, where several yards of cattle have to be fed. This was the problem facing Mr. E. D. Keene, who farms 304 acres at Ross-on-Wye, on the Guy's Hospital Herefordshire estate. The five yards in which his father had kept his fattening stock are spacious, substantially built, well supplied with water, and in the main typical of the traditional cattle yard in this part of the county. They reflect cheaper labour, chopped roots, linseed cake and chaff. Mr. Keene had been making silage in a surface silo and feeding by the cut-and-carry method, but this took a lot of labour and did not entirely satisfy him. He accepted the principle of self-feeding, but the layout of the yards and position of other buildings made it impossible to plan one or even two silos so that four of the five yards could self-feed.

But if cattle will walk out of a yard and self-feed silage, why should not several yards of cattle walk rather further than usual and still self-feed? Mr. Keene took advantage of the Silo Subsidy Scheme to enlarge and improve the original silo, leaving it substantially on the old—and, for this purpose, still suitable—site. A flail-type forage harvester was bought and the necessary alterations made to trailers. Then, and this is the heart of the scheme, a lane leading from the silo area around the buildings to the cattle yards was fenced off. The system works as follows:

Plan in action

Seventeen younger cattle move out of Yard 1 and up the lane to the south face of the silo, where they are secured by a simple gate system on the silo apron. Then the fifteen older cattle from Yard 4 move out and feed off the north face. After about 3½ hours, all are obviously satisfied and return to their yards—the younger cattle for hay, and the older beasts for a ration of 2 lb barley meal and 2 lb fattening cake (these older cattle are in a good forward condition and Mr. Keene is now—in January—considering reducing the cake ration). Next come fourteen forward cattle (the next bunch for market) from Yard 3, and thirty-five rather younger cattle (due to summer out in 1959) from Yard 2. About 3½ hours at the face is again enough. Yard 2 then returns to straw only and Yard 3 to 2 lb barley meal and 2 lb fattening cake, like Yard 4. Water is available in all the yards but not at the silo. Single handed, the stockman can change over from the first shift of two yards to the second in nine minutes.

Cattle are controlled at the silo face by an electric fence, adjusted as they feed inwards. To overcome any crowding at the face when the thirty-five cattle from Yard 2 all wish to feed at once, the top layer of silage is placed

in a manger formed against the silo side. (A layer is stripped off the top before feeding, to enable the cattle to obtain a "bite" at the silo face.) This extra silage in the manger takes the edge off their appetite, and feeding then continues quietly at the face. None of the younger cattle had previous experience of an electric fence, but within ten days they had settled down to the routine and learned to expect the daily journey to the silo. All cattle are dehorned.

The silo measures 7 × 34 yards, with sleeper sides. Its concrete floor rises in the centre, so that both feeding face floors have falls towards the cattle. This helps to prevent dung and urine running under the silage, and encourages clean feeding down to the bottom of the silo. Drawing a loaded trailer over the green material during the making has not over-consolidated the silage in the centre.

Economy of feed and labour

Taking all ages of stock into consideration, the silage consumed per feed is estimated at an average of 60 lb per head (13 cwt per cubic yard). This year the silo is almost filled by 23 acres of one-year ley (one cut) and the three outside bouts from the river meadows, later cut for hay.

Next year it is planned to bring in Yard 5, which contains the youngest cattle, at present solely on a hay, cake and roots regime. Now that a routine has been established and the teething troubles of the system are past, the farm staff are enthusiastic about the innovation, which has removed much of the drudgery from their work. From their appearance, the stock too would seem to approve.

I gratefully acknowledge Mr. E. D. Keene's kind co-operation in agreeing to this article and also the help and information given by his foreman and head stockman.

Farming Cameo: Series 2

14. Kingsbridge, Devon

A. WATT
District Advisory Officer

KINGSBRIDGE DISTRICT is the stretch of land lying between Dartmoor and the south coast, roughly within the triangle formed by Plymouth, Salcombe, and Dartmouth. On first glance at a map, this land appears to be level, but in fact it is more like the petrified surface of a storm-tossed sea, the waves of which stretch in all directions and rise from about fifty to three hundred feet from trough to crest. Configuration has always dominated farming in South Devon; on the great majority of farms the arable land lies across the rounded brow of a hill, and the pastures are steep slopes giving way, at lower levels, to sheltered meadows. The inescapable consequence is that arable fields are overcropped, while the slopes and meadows have avidly seized every opportunity to revert.

Ley farming and improved fertilizing practice since the war has restored fertility to much of the arable land, while the crawler tractor and the £12 per acre ploughing grant have transformed slopes previously forsaken as too dangerous to reclaim. Spraying and draining have multiplied the stock-carrying capacity of hundreds of acres of meadow land. A good example of meadow reclamation is the two-mile stretch of valley from Loddiswell to Aveton Gifford.

In harmony with this undulating but picturesque landscape, many estuaries, such as those at Salcombe and Newton Ferrers, bite deeply into the countryside, forming multitudes of creeks which branch out like the limbs of a tree. These estuaries, together with several deep valleys cut out by fast-flowing rivers like the Avon and the Dart, make communications within the district extremely difficult. The countryside is a maze of steep and narrow lanes and unclassified roads.

Topography in the Kingsbridge District is undoubtedly uneven, but geology, on the other hand, is remarkably regular. Schists, grits and slates stretch in a neat series of bands across the countryside from east to west. These Devonian slates are marine deposits, the land having been submerged many times in its long history. They contain very few fossils. South Devon is the southern limb of a great syncline, the northern limb being in the north of the county. Near Plymouth are beds of limestone consisting largely of corals, with some lampshells and trilobites.

High annual rainfall is responsible for leaching the strong bases from the soil, and acidity has fixed the phosphates. Experience has shown that shortages of lime and phosphate are best made good gradually, to avoid deficiency troubles in crops and functional disorders in stock. Boron deficiency occurs fairly frequently, especially on ley roots which have received a dressing of lime. Whiptail, a deficiency disease of broccoli, crops up occasionally.

Copper and iodine deficiencies in stock have been investigated; the trouble seems to be due to conditioned nutritional deficiencies rather than to imbalance in the soil or feedingstuffs. A great asset which the soils of Kingsbridge possess is their ability to crumble following poaching. Only in a few pockets of heavy soil is there any great difficulty in obtaining a seedbed.

Twelve years ago a black and white cow was almost an oddity in South Devon, which has its own breed of cattle, but nowadays the milk breeds have penetrated to even the most conservative farms. An increase in the premium for milk of high butter fat and the national swing towards beef have brought the South Devon back into favour. It is a first-class converter of bulky foods and, given plenty of time, will fatten at low cost. Intensive winter fattening in yards is on the increase, and more and more cattle are being graded out in early spring. A live weight of 11 cwt and more is not uncommon at under two years of age.

South Devon sheep are on the big side to meet the present-day demand for small joints, but crossed with the Suffolk they give excellent results. The lambing percentage is comparatively low, but South Devons possess the valuable ability to mate early. More and more farmers are taking advantage of this to lamb their ewes down before Christmas, thus obtaining the higher prices for Easter lambs. For this enterprise to be economic, special crops, such as rye and ryegrass, must be grown to provide cheap nutritious food for the milking ewe. This is not difficult in the south-west, where the mild winters are kind to autumn-sown catch crops. In a mild winter such as we have had this year, autumn-sown Italian ryegrass is ankle deep by the third week in February, and in hard winters rye provides the early bite.

One feature of silage feeding is worthy of mention. Although many farmers favour self-feeding, the hilly nature of the land surrounding farmyards often precludes it. But the sharp slopes have in some cases been turned to good advantage by digging a Dutch barn silo down into the slope on the higher side of the cowhouses and close to the feeding passages: feeding by barrow is always downhill and the silage, if baled, is easy to handle and simple to ration.

Crops take second place to grass in the Kingsbridge District, not only because of the steep and small fields and the moist climate, but also because of their greater susceptibility to pests and diseases during the warm, humid summer. Wheat suffered so badly from black stem rust in 1955 that few farmers grow it today. Oats are seldom a full crop because of frit fly and crown rust. Potatoes, more often than not, are blackened with blight by the middle of August. In their efforts to find answers to these problems, the specialists of the N.A.A.S. and Research Stations enjoy generous co-operation from local farmers. Kingsbridge grows some of the Devon Eaver herbage seed sent annually to Northern Ireland as stock seed: this strain of perennial ryegrass is particularly resistant to blind seed disease.

A development not without significance for the future is the increase in the number of farmer contractors in the district. The farmer contractor can buy machinery which he cannot justify for his own acreage, and the system is of tremendous benefit to customer farmers lacking capital. An extension of this idea, already in operation in the district, is the purchase and sharing by a group of farmers of machinery which singly they could not afford.

At the Farmers' Club

Developments in the Pig Industry

"As a whole the pig industry is *not* inefficient." Sir Alick Buchanan-Smith, C.B.E., D.Sc., vice-chairman of the Pig Industry Development Authority, was emphatic about this when discussing the immediate prospects and long-term outlook of the British pig industry at the Farmers' Club on 8th April. But he added a warning that we can—and must—become still more efficient.

"Methods of pig production, processing and marketing must be improved to a point where prices to the consumer and taxpayer can be cut. If we can achieve this it will be accompanied by increased demand and an expanding market for pig products. But any increase in the price of the rasher of bacon or of fresh pork is almost certain to result in a decline of consumption."

In 1931, out of the 1 m. tons of pig-meat consumed in the United Kingdom, only 28 per cent was home-produced. Last year, though consumption was appreciably less, 64 per cent was home-produced. Whereas in 1931 total production was just over 300,000 tons, today we are producing 650,000 tons of pig-meat a year—twice as much bacon and twice as much pork.

The modern housewife's choice, or, as Sir Alick put it, "the taste she attributes to her husband and the boys", is most interesting. We are now eating less bacon per head than in 1934–38 (25 lb as against 28), but more pork (17 lb now against 11 then). This substantial increase in pork consumption is not all due to the discovery that pork tastes equally good in all months of the year; less mutton and lamb are being eaten nowadays. If imported beef became scarce, the broiler chicken and the pork pig would be the only sources of home-produced meat to fill the gap. Pork has flavour and is more succulent than chicken, but the pig will compete successfully with the broiler only if the amount of fat is reduced.

Today the pig trade comprises three roughly equal parts—bacon, pork and manufactured products. Though these outlets for pig-meat are to some extent mutually competitive, other factors are also involved in creating demand, as the 1956 Bosanquet Report pointed out. Since then, manufactured products, which compete with a wide range of foods, very largely those associated with the modern self-service stores and supermarkets, have been developed considerably, and, said Sir Alick, "it does look as though future expansion of the pig trade will be in this direction". The market for the pig is anything but static and the producer must be in a position to adjust his type of pig to market requirements.

Those who grow the bacon pig would be wise to concentrate on their one type, for which the market is reasonably assured. The standardized carcass, "much measured and examined", lends itself to the production of bacon pigs by factory methods, and any modifications made will aim at greater efficiency of production rather than at new types. The market for bacon pigs, now around four million a year, is unlikely to expand in the foreseeable future. "The day will come when an extraordinarily uniform article will be produced for the bacon curer, almost certainly produced under uniform

conditions, for it is no good breeding for uniformity and then, by haphazard husbandry, creating variety."

The problem that really faces the British pig-farmer today is the type of pig required for pork and for manufacture. The all-purpose pig is no solution, for though the consumer insists on lean meat, we are still ignorant of the ideal carcass for the pork trade and for manufactured pig-meat, and equally so about how to achieve the desired proportions of fat to lean for the different weights of pig involved. Sir Alick declared that the full and economic development of the non-bacon pig is limited by the absence of organized research on the end-product: "the institution of a proper centre for meat research," he said, "is long overdue".

Cross-breeding is important, both as a source of vigour and as a means of speedily meeting changes in market demands. Firmly rejecting the Howitt Report's recommendation of three types of sow, one for each market, to be mated with only one type of boar, Sir Alick considered that there should be as many variations in type of sow as the general economies of British farming might require. Variations in market needs would be met by using at least three types of boar, all of them tested.

Very substantial savings are possible by economies in labour, increase in numbers weaned, and economy of feed conversion. In Denmark, fourteen pigs per sow are marketed each year, compared with fewer than twelve here. For every pound of liveweight gain the English pig-farmer feeds ½ lb more meal during fattening and nearly 3 lb more for weaner production than his Danish counterpart. The difference between the feed conversion rates ruling here and the more efficient conversions attained by some groups reported by the Progeny Testing Board—5 and 3 lb of meal per pound liveweight gain respectively—represents about £5-worth of meal. Such a saving is within the compass of any pig producer prepared to benefit from pig recording and progeny testing, irrespective of the market he aims for.

The small pig-keeper is a basic asset to the nation, for nearly 70 per cent of the pig population of England and Wales live on farms of under 100 acres. The majority of such farmers lack capital for streamlined production; they must be helped to become more efficient, by the provision of more efficient breeding stock as well as by better management.

Ten years from now, said Sir Alick, consumer demands may be very different and there will certainly be new methods of marketing, management and processing, requiring research at each level of the industry. "Are we prepared to support that research and to put the new knowledge into practice even though it means breaking with our most cherished traditions?"

Sylvia Laverton

Agricultural Statistics England and Wales

JUNE, 1958, AGRICULTURAL RETURNS (FINAL)

CROPS AND GRASS

(thousand acres)

DESCRIPTION	1957	1958
Wheat	2,032	2,115
Barley	2,390	2,526
Oats	1,320	1,247
Mixed corn, for threshing	328	272
Rye, for threshing	24	22
Total corn	**6,095**	**6,182**
Beans, for stockfeeding	86	88
Peas, for stockfeeding	14	15
Potatoes, first earlies	96	85
Potatoes, main crop and second earlies	469	491
Total potatoes	**565**	**575**
Turnips and swedes for stockfeeding	244	234
Sugar beet (for sugar)	415	423
Fodder beet (all types of high dry matter content)	14	12
Mangolds	148	142
Rape (or cole)	118	104
Cabbage, kale, savoys and kohl rabi, for stockfeeding	345	354
Vetches or tares	16	19
Mustard, for seed, fodder or ploughing in	32	35
Hops	20	21
Orchards with crops, fallow or grass below the trees	241	235
Orchards with small fruit below the trees	8	8
Small fruit, not under orchard trees	30	31
Vegetables (other than potatoes) for human consumption and grown primarily for sale, hardy nursery stock, flowers and crops under glass	419	440
Fruit and vegetables, not grown primarily for sale	8	7
All other crops	46	43
Bare fallow	305	246
Total of crops and fallow (tillage)	**9,171**	**9,216**
Lucerne	101	96
Temporary grass (including clover and sainfoin)		
for mowing	2,376	2,446
for grazing	1,798	1,732
Total	**4,174**	**4,178**
TOTAL ARABLE LAND	**13,447**	**13,490**
Permanent grass for mowing	2,897	3,087
Permanent grass for grazing	8,143	7,930
Total	**11,040**	**11,017**
Arable and permanent grass temporarily out of use through flooding on the East Coast January/February 1953	4	(a)
TOTAL ACREAGE OF CROPS AND GRASS excluding Rough Grazings	**24,491**	**24,506**
Rough grazings:		
Sole right	3,626	3,573
Common rough grazings	1,482	1,485
Total rough grazings	**5,108**	**5,058**

(a) Not separately collected.

*CLOVER, SAINFOIN AND OTHER TEMPORARY GRASSES**

(thousand acres)

DESCRIPTION	1957	1958
Sown last year (1957) as one-year ley to be ploughed for cropping next year	658	561
Sown in 1957 as a ley to be left down longer than one year	992	856
Sown in 1956 or earlier	2,311	2,501
Sown this year (1958) without a nurse or cover crop	213	259
Total	**4,174**	**4,178**

* Raised figures to cover the (about) 11 per cent of the occupiers in 1957 and the (about) 12 per cent in 1958, who did not supply information.

SMALL FRUIT

(thousand acres)

DESCRIPTION	1957	1958
Strawberries	16·1	16·7
Raspberries	2·7	2·5
Currants, black	11·5	12·3
Currants, red and white	0·9	0·7
Gooseberries	5·7	5·4
Loganberries and cultivated blackberries	1·3	1·2
Total	**38·2**	**38·9**

VEGETABLES FOR HUMAN CONSUMPTION, HARDY NURSERY STOCK, FLOWERS AND CROPS UNDER GLASS

(thousand acres)

DESCRIPTION	1957	1958
Vegetables for human consumption (excluding potatoes) grown in the open		
Brussels sprouts	42·6	47·4
Remaining spring cabbage (planted in previous year)	7·8	9·4
Summer cabbage	7·6	9·0
Autumn cabbage	5·1	5·2
Winter cabbage	12·8	12·6
Autumn savoys	2·6	2·3
Winter savoys	8·8	6·9
Kale and sprouting broccoli	2·5	2·7
Winter cauliflower or broccoli (heading):		
Remaining from previous year's plantings	2·3	3·3
Planted in the current year	9·6	10·3
Summer and autumn cauliflower:		
Early summer sown under glass and planted in the open	6·1	6·9
Late summer and autumn (open sown)	8·6	10·0
Carrots, earlies (grown for bunching only)	2·2	2·1
Carrots, main crop	25·3	30·8
Parsnips	3·7	4·1
Turnips and swedes	5·1	4·7
Beetroot	8·3	8·9
Onions, grown for salad	1·2	1·5
Onions, for harvesting dry	3·0	3·1
Beans, broad	9·9	11·3
Beans, runner	9·8	10·2

Description	1957	1958
Beans, dwarf or french	2·7	3·1
Peas, green for market	30·8	34·4
Peas, green for canning or quick freezing	52·4	55·5
Peas, for harvesting dry:		
Marrowfats	56·0	60·6
Blues	22·0	11·8
Asparagus	1·5	1·4
Celery	4·5	5·5
Lettuce	7·1	7·8
Rhubarb	5·0	5·1
Tomatoes (growing in the open)	0·7	0·6
Other vegetables and mixed areas	17·5	17·4
Total	**385·2**	**405·8**
Hardy nursery stock:		
Fruit trees, fruit bushes and other fruit stock	4·1	3·8
Ornamental trees and shrubs	5·0	5·5
Other nursery stock (herbaceous plants, alpines, etc.)	4·0	3·7
Bulbs and flowers in the open:		
Bulbs grown for flowers:		
Daffodils (Narcissi)	3·7	4·1
Tulips	1·8	1·8
Other bulb flowers	0·8	0·8
Bulbs grown for sale as bulbs:		
Daffodils (Narcissi)	1·5	1·7
Tulips	1·7	1·7
Other bulbs	0·2	0·2
Other flowers, not under glass	6·5	6·8
Total	**16·3**	**17·1**
All crops grown under glass	**4·5**	**4·4**

LIVESTOCK

(*thousands*)

Description		1957	1958
Cows and heifers in milk:			
For producing milk or calves for the dairy herd		2,142	2,171
Mainly for rearing calves for beef		467	428
Cows in calf but not in milk:			
Intended for producing milk or calves for the dairy herd		361	353
Intended mainly for rearing calves for beef		85	86
Heifers in calf (first calf)		659	600
Bulls being used for service		60	56
Bulls (including bull calves) being reared for service		23	21
Other cattle:			
2 years old and over	Male (Steers)	530	465
	Female	511	463
	Total	**1,041**	**928**
1 year old and under 2	Male (Steers)	587	604
	Female	1,010	1,022
	Total	**1,596**	**1,626**
Under 1 year old	Male (Steers)	624	777
	Female	1,072	1,111
	Total	**1,696**	**1,888**
TOTAL CATTLE AND CALVES		**8,130**	**8,157**
Calvings which occurred during the three months preceding date of census:			
Heifers that calved for the first time during March, April and May		172	160
All other cows that calved during March, April and May		601	597
TOTAL CALVINGS		**774**	**757**

DESCRIPTION	1957	1958
Sheep one year old and over:		
Ewes kept for breeding	6,207	6,589
Two-tooth (shearling) ewes or gimmers	1,359	1,605
Rams kept for service	174	191
Draft and cast ewes	231	255
Wethers and other sheep	513	524
Total one year old and over	**8,485**	**9,165**
Sheep and lambs under one year old	7,521	8,031
TOTAL SHEEP AND LAMBS	**16,006**	**17,196**
Sows in pig	312	354
Gilts in pig	129	117
Other sows kept for breeding	166	194
Total sows for breeding	**607**	**665**
Barren sows for fattening	16	21
Boars being used for service	37	40
All other pigs:		
5 months old and over	859	874
2–5 months old	2,024	2,230
Under 2 months old	1,216	1,370
Total all other pigs	**4,099**	**4,474**
TOTAL PIGS	**4,759**	**5,199**
Fowls 6 months old and over	31,923	32,507
Fowls under 6 months old:		
Male	5,308	6,832
Female	31,094	31,813
Sex not known	2,344	4,154
Total fowls under 6 months old	**38,746**	**42,799**
TOTAL FOWLS	**70,669**	**75,306**
Ducks of all ages	1,114	1,021
Geese of all ages	428	363
Turkeys of all ages	1,762	1,795
TOTAL POULTRY	**73,973**	**78,485**
Horses (including mares kept for breeding) used for agricultural purposes or by market gardeners	87	72
All other horses and ponies	95	95
TOTAL HORSES	**182**	**167**

LABOUR

(*thousands*)

DESCRIPTION	1957	1958
Regular whole-time workers:		
Male, 65 years old and over	20·2	17·3
„ 20 years old and under 65	328·1 (a)	319·5
„ 18 years old and under 20	28·3	28·3
„ under 18 years old	35·3	34·1
Total	**411·8 (a)**	**399·5**
Women and girls	36·2	32·9
Total male and female	**448·0 (a)**	**432·4**
Regular part-time workers:		
Male, 20 years old and over	42·3	39·9
„ under 20 years old	5·1	4·8
Total	**47·4**	**44·7**
Women and girls	31·5	28·7
Total male and female	**79·0**	**73·4**

DESCRIPTION	1957	1958
Seasonal and temporary workers:		
Male, 20 years old and over	42·2	43·0
" under 20 years old	3·7	3·9
Total	45·9	46·9
Women and girls	33·8	37·9
Total male and female	79·7	84·9
TOTAL MALE WORKERS	505·2 (a)	491·1
TOTAL FEMALE WORKERS	101·5	99·5
TOTAL WORKERS	606·7 (a)	590·6

(a) Corrected figure.

In Brief

MARKETING POTATOES

Writing in the spring number of *Scottish Agriculture*, Mr. James Rennie, chairman of the Potato Marketing Board, delineates the difficulties in matching potato production with supply at reasonable retail prices. In the twenty-five years since the first Potato Marketing Board was elected, we have seen the area under potatoes in Great Britain rise from about 589,000 acres in 1939 to its peak of 1,338,000 in 1948 and then fall to 722,000 acres in 1958. Yields, too, have varied widely: from the lowest, 5·7 tons per acre in 1947, to the highest, 8·4 tons per acre in 1953 and again in 1956. Yet the demand for human consumption remains much about the same; there is no great response to lower retail prices.

It is clearly to everyone's interest that the total potato acreage should be kept at a fairly constant level, and it is a primary function of the Board to try and equate potato production (i.e., acreage and yield) with normal human consumption at reasonable shop prices. The Potato Marketing Scheme provides that all Registered Producers shall be entitled to a basic acreage for potatoes. The quota for Registered Producers this year is 100 per cent of the basic acreage on each farm.

For seventeen years, potato growers have had the advantage of an individual guarantee which ensured that they knew when they planted what price they would get for each ton they produced. There will, however, be a change in these arrangements in 1959. H.M. Government have decided to discharge the obligation of the guarantee in Great Britain by paying to the Board, for the industry as a whole, a sum based on the difference between the average market price throughout the season and the price determined at the previous annual review. The guarantee will relate not to all the potatoes which have been grown, as in the past, but to the quantity sold for human consumption. If average market prices have been higher than the price determined at the annual review, then no deficiency payment will be due to the Board. In years when the *yield* is higher and there are surplus potatoes, however, market prices will no doubt be below, perhaps well below, the annual review price. It will be the Board's task to use the Exchequer subvention in such a way that average prices to producers are improved and all producers get a reasonable return for the crop they produce and avoid if possible individual producers having large tonnages left on their hands at the end of the season.

When the Board have to deal with surpluses under the new guarantee arrangements, the first measure will be to reduce the quantity which Registered Producers may sell for human consumption. This will be done by increasing the minimum size of the riddle. Some of the surplus will thus be kept on the producing farms for stockfeed or for sale as stockfeed. If the surplus is small, no further measures may be necessary, but with a larger surplus the Board may have to buy potatoes. And if the Board buy potatoes they are immediately faced with the problem of what to do with them. There is, in fact, only one market for the surplus and that is for stockfeeding in one form or another.

Merchants' figures show that the present level of human consumption of potatoes is 201 lb per head per year, and that the decline between 1946–47 and 1955–56 has now steadied. Consumption is still substantially above pre-war level which, it has been assessed, was between 170 and 190 lb per head.

BROODER IMMUNE FROM DANGERS OF POWER CUTS

A new type of brooder for chicks, operated on the same principle as electric floor-warming, with the added advantage that it also acts as a heat storage unit, will be a boon to poultry farmers, for it maintains a steady temperature of around 100°F yet requires current for only twelve out of every twenty-four hours.

This design, developed by the Eastern Electricity Board's agricultural engineer Mr. E. C. Claydon, effectively safeguards the chicks against the otherwise dire results of a power cut at a critical stage of rearing. An area of about 36 square feet, suitable for up to 1,000 day-old chicks, is heated by two layers of plastic insulated cable carrying 1 kilowatt, embedded one above the other in a 12-inch depth of sand, concrete, or other convenient flooring material. Thermal insulating boards placed below and at the sides of the heated "floor" keep the warmth in.

A ventilated canopy placed about a foot above the floor, containing low-voltage filament lamps supplied by a battery, gives a focal point for the chicks. A temporary barrier, made for instance from corrugated cardboard, keeps the chicks in and the draughts out. Thus installation is simple and cheap, and easily put into existing buildings, on a "do-it-yourself" basis. Running costs are much lower than for orthodox brooders, especially where power is available at cheap off-peak rates. Experimental units have been operated successfully on farms in Buckinghamshire, Suffolk and Essex.

SPRAY DRIFT DAMAGE

Cases of spray damage are relatively few in relation to the large area sprayed each year, but individual losses involving valuable horticultural crops can run into thousands of pounds. This trouble is most likely to arise where cereal and horticultural crops are grown near each other, the most vulnerable crops being tomatoes and lettuce, the crucifers (turnips, swedes, cabbages, cauliflowers, kale, Brussels sprouts, etc.) and sugar beet.

The modern plant growth regulators such as MCPA and 2,4-D are highly efficient and, under normal conditions, are safe from the points of view of toxicity to man, damage to machines and fire risks. But the fact that fine spray can travel quite a distance with the natural movement of the air, means that you can't be too careful where neighbouring susceptible crops are concerned.

The general pattern is for growers to suffer from spraying done by others, but it is not uncommon for them to damage their own crops, especially sugar beet. Tomato crops can be lost by drift into glasshouses, and damage can result from the spraying of roadside verges.

The points to watch are: choose suitable weather, preferably when there is a light but steady wind blowing away from susceptible crops; have the spray-bar

set as low as possible—proper distribution of the chemical can be obtained with a lower spray-bar by placing the nozzles closer together, by widening the spray angles or by tilting the "fan" nozzles away from the tractor at an angle of 45 degrees from the vertical. It is also desirable that sprays should be applied in high volumes and at low pressures so that the droplets are larger and less likely to drift. An additional precaution is a polythene hood mounted on a light steel frame over the spray-bar.

"Blow-off" occurs mainly with DNC weed-killers and is, of course, difficult to prevent, except by avoiding spraying before the emergence of nearby susceptible crops or by leaving unsprayed a strip of 20–30 yards wide.

DODDINGTON PARK FARM

Our cover photograph this month shows some of the Half-bred ewes running at Doddington Park Farm, near Nantwich, Cheshire, the home of Sir Evelyn Delves Broughton. Once a rabbit warren granted under Royal Charter by Charles II, and until 1939 nothing more than a stretch of picturesque parkland abounding with deer and rabbits, Doddington Park is today a progressive farming estate.

During the war years, Doddington Park was used for Army training, and when Sir Evelyn decided to turn the estate to agricultural use after the war, the work of reclamation was carried out by the Cheshire Agricultural Executive Committee. Previous neglect of the land had resulted in a heavy loss of soil fertility, and at the outset it was decided to use heavily stocked short-term leys to pay the way while soil fertility was rebuilt.

Now Doddington Park carries an attested herd of 210 Ayrshire and Friesian cattle, including followers; a poultry unit of over 4,000 birds; a breeding herd of 50 Large White sows, some of which are put to Landrace boars; and flocks of 50 Cheviot and 80 Half-bred ewes. Another livestock unit, in the form of a beef enterprise, is also being built up by using an Aberdeen-Angus bull on all first-class heifers in the dairy herd. In addition, all pure Friesian males are steered and introduced into the beef section.

Great stress is placed on the use of home-produced feedingstuffs as the basis of production, and costings carried out under the I.C.I. Grassland Management Investigation Scheme for 1957–58 showed that a herd average of 766 gallons was achieved with 94 per cent of all food requirements coming from the grassland and only 1·4 lb of concentrate to the gallon. In the last five years the gross output per acre has increased from £63·6 to £97·6, as against the £67·4 considered as the production standard for High Profit Dairy Farms of over 150 acres.

WORLD PLOUGHING CONTEST

It is at Armoy, Co. Antrim, N. Ireland this year that the skill of the world's best ploughmen will be put to the test. Sixteen nations will be competing for the coveted championship award. Armoy, with its roots in the first settlements of the earliest Christian times and formerly a flax-producing centre for Ulster linen, is still a typical small Irish village, set in an area of rich grazing land and fields of barley, oats and potatoes. Inquiries for accommodation should be sent to the Northern Ireland Tourist Board, 6 Royal Avenue, Belfast or to the Town Publicity Officers of the neighbouring Port Stewart, Port Rush, Coleraine and Ballycastle.

THE MINISTRY'S PUBLICATIONS

Since the list printed in the April 1959 issue of AGRICULTURE (p. 39), the undermentioned publications have been issued.

MAJOR PUBLICATIONS

Copies are obtainable at the prices quoted from Government Bookshops or through any bookseller.

BULLETINS

No. 4. Bush Fruits (*Revised*) 4*s.* (4*s.* 4*d.* by post)
Deals with all aspects of growing, harvesting and marketing black currants, red currants and gooseberries, and describes tools and machinery suitable for use in plantations.

No. 178. Beef Production (*New*) 5*s.* (5*s.* 5*d.* by post)
This bulletin deals with Britain's beef supplies and describes comprehensively how to get the best results by breeding, rearing and nutrition. Our sources of supply are touched on and all the breeds associated with good table beef are included, with descriptions of their characteristics. Contains many diagrams and graphs.

No. 180. Hybrid Chickens (*New*) 2*s.* 6*d.* (2*s.* 9*d.* by post)
The first complete British account of the method of breeding poultry hybrids on a commercial scale and an assessment of their value.

OTHER PUBLICATIONS

Infestation Control: A Service to Agriculture and Food Storage (*New*) 4*s.* (4*s.* 5*d.* by post)
An account of the research undertaken by Infestation Control Division into damage caused to growing crops and stored products by insect pests and harmful wild life and on methods of controlling these pests.

Barley (*New*) 3*s.* 6*d.* (3*s.* 10*d.* by post)
The third in the new series on arable crops, this booklet deals with the growth of barley—both malting and feeding—from choice of seed to harvest sample, and the disposal of the crop through corn exchanges.

Report on the Animal Health Services in Great Britain 1957. Including Report of Proceedings under the Diseases of Animals Act, 1950. (*New*) 6*s.* (6*s.* 5*d.* by post)

Return of Proceedings under the Diseases of Animals Act, 1950 for the year 1958. (*New*) 9*d.* (11*d.* by post)

Agricultural Statistics 1957–58. United Kingdom Agricultural Censuses and Production. (*New*) 3*s.* 6*d.* (3*s.* 10*d.* by post)

LEAFLETS

Up to six single copies of Advisory Leaflets may be obtained free on application to the Ministry (Publications), Soho Square, London, W.1. Copies beyond this limit must be purchased from Government Bookshops, price 3d. each (5d. by post).

ADVISORY LEAFLETS

No. 472. Chicory as a Root Crop (*New*)
No. 473. Nosema Disease (*New*)

FIXED EQUIPMENT OF THE FARM LEAFLETS

No. 37. Tree, Bush and Stump Clearance (*New*) 1*s.* 3*d.* (1*s.* 5*d.* by post)

FREE ISSUES

Obtainable only from the Ministry (Publications), Soho Square, London, W.1.

UNNUMBERED LEAFLETS

Rout Warble Fly (*Revised*)
Fire Blight (*New*)

Book Reviews

The Aberdeen-Angus Breed: A History. J. R. BARCLAY and A. KEITH. The Aberdeen-Angus Cattle Society. 50*s*.

The Aberdeen-Angus Breed: A History, begun by the late J. R. Barclay and revised and completed by Alexander Keith, throws some valuable light on the usually obscure subject of the motives and aspirations of breed "improvers". In the early chapters it is quite casually mentioned that the great Hugh Watson bred Leicester and Southdown sheep as well as Aberdeen-Angus cattle. Surely it is no accident that these two improved carcass sheep breeds, developed a comparatively few years previously by Bakewell and Ellman, were to be found in the hands of the man who laid the foundations of the modern Aberdeen-Angus. He must have aimed at supreme carcass quality from the first, and used the same in-breeding methods as the great eighteenth-century breeders.

If the boisterous yet secretive Watson was the breeding genius, then William McCombie was the master showman. He admired Watson and bought his stock at intervals to reinforce his important Tillyfour herd, but the progress of the breed virtually turned on his determination to defeat the fashionable Shorthorns and Herefords. His successes at shows all over the British Isles with the new "blackskins" were remarkable; but the famous climax at the Paris Exhibition of 1878, when his own group of Aberdeen-Angus were supreme champions over sixty-five other breeds and crosses, opened the growing export market to the breed at a crucial moment.

Now a wise counsellor was needed, and he was found in the person of Sir George Macpherson-Grant. His herd at Ballindalloch is numbered among the greatest, while his personal contribution to the progress of the Breed Society from its formation seems to have been unequalled.

The careers of these three men covered a hundred years, and it seems that there had never been any deviation from the search for a better and better carcass beast.

It is true that for many years the three-year-old or over with plenty of weight was the ideal; but the excellent chapter on the Smithfield Show brings worthwhile reminders that classes for "yearlings" were started in 1899, and that the Aberdeen-Angus cross heifer made supreme champion in 1919 was only twenty months old. Enthusiasm for lightweight beef is evidently not modern and the breed is well practised in meeting the need.

Needless to say, the amount of material that has to be included in a book of this kind is enormous and, selective as he was, the author's many chapters on herds, shows and sales may even daunt the enthusiast. One wonders whether full-page descriptions of class results at nearly every Highland Show from 1885 to 1955 are really required even in a complete history. However, Mr. Keith's clear style is equal to all demands, and the book is beautifully produced.

P.McK.

The Great Tide. HILDA GRIEVE. Essex County Council. 30*s*.

This is the official story of the 1953 flood disaster in Essex, when the sea overwhelmed the coastal defences and brought death, suffering, havoc and destruction to the coastal belt of the county. It is refreshing to read an official history written with such dramatic skill, and it is no exaggeration to say that Miss Grieve has proved herself an outstandingly capable chronicler who pilots the reader ably and surely through the mass of events which caused such confusion on that fateful weekend. The story is delightfully tempered with phrases that are a melody to read, and the flashes of humour, inseparable from the British people in adversity, are faithfully recorded.

Setting the stage with an account of the development of the Essex marshes and the centuries-old conflict which Essex men have waged with the sea, Miss Grieve quickly carries the reader to the 27th January, when the depression "L.Z"—the

villain of the piece—was born out in the Atlantic. From there on the tension mounts with each page as we see "L.Z" grow into the terrible storm centre which brought disaster at sea and on land.

The force of the author's writing is such that the reader feels he is playing a personal part in these events. One moment we are with the Harwich Harbour Master, then with the sluice-keepers anxiously watching their tide gauges. Back at the River Board and Police offices, telephone reports mount as the danger grows. When finally the sea crashes devastatingly along miles of coastline, the reader is there with people from every walk of life, some fighting for their lives, some to die, some performing feats of superhuman achievement to warn and rescue others from an all-enveloping peril.

As the sea smashed through the defences, communications were cut, isolating those on the spot and leaving those in authority ignorant of what was happening or where help was needed. The way in which local officials and just very ordinary people confronted this chaos, fought the turmoil and organized rescue and relief before the full resources of the local authorities and Government could be mobilized, was an epic.

Dealing with the dead and the destitute, both human and animal, were enormous problems in themselves, while the task of securing the walls against further invasion in the vital fourteen days before the next spring tides was as fantastic an achievement as has ever been carried out in time of peace in this country. The chaos and damage to agriculture, industry, communications and public services are fully described, as are the works of repair and rehabilitation. Miss Grieve has the enviable gift of being able to translate highly technical material into a simple language that ordinary people can understand, and herein lies one of the charms of this book.

In a disaster of this magnitude which strikes whole communities, there is no aspect of public administration and service which does not become involved in addition to the commercial and private interests directly affected. It is an incredibly complex story, but Miss Grieve has skilfully woven the threads into a clear and accurate picture. The statistical information in the text—for example, of refugees, emergency meals served, sandbags used, labour force, to mention a few, and some of the known costs—provide a measure of the blow that struck Essex on that unforgettable night. Perhaps the most delicious piece of descriptive writing in the book is the account of the valiant work of Essex's lady District Advisory Officer on the sea wall at the height of the emergency operations.

D.G.B.

Fancy Pheasants, Jungle Fowl and Peafowl for Beginners. CHARLES H. TREVISICK. Cage Birds. 12*s.* 6*d.*

For those who are considering starting a small aviary for fancy pheasants, or jungle fowl, which are the ancestors of our multiplicity of breeds of domestic poultry, this is a good ABC.

The author is obviously an essentially practical man of wide experience, and the chapters dealing with the construction of the aviary and the rearing and feeding of pheasant chicks are excellent. Then follow short descriptions of twenty-eight varieties of fancy pheasant. There are colour plates showing eighteen varieties of pheasant, the Cochin-Chinese red jungle fowl, and two varieties of peafowl. The plates are harsh, but good enough to assist in identifying the major varieties.

The reader is correctly warned to go warily when entering the aviary, and the author might well have followed this advice when entering the field of disease. For example, it is not very helpful to state that wounds should be treated with a teaspoonful of boracic powder dissolved in warm water unless some idea is given of the amount of water. Also there is reference to inoculation against various diseases, including tuberculosis of the liver, with the odd suggestion that anticholera is generally used for this immunization.

The two chapters on jungle fowl and peafowl are concise and written in a practical and easy style. A short chapter on making an ornamental garden to incorporate an aviary or an ornamental pond for waterfowl is followed by another entitled "Questions and Answers". The book is well produced and indexed.

The final page lists the Latin names and English equivalents of the birds referred to, and this is extremely helpful to anyone wanting to disentangle the classification of the pheasant family.

W.M.A.

The Agricultural History Review. (Vol. VII, Part I, 1959.) Edited by H. P. R. FINBERG. The British Agricultural History Society. 12*s.* 6*d.*

An examination of the midden of bones that accumulated at Kirkstall Abbey in Yorkshire between the middle of the fifteenth century and the Dissolution showed that the monks ate beef, mutton, venison, rabbits, various kinds of bird, and fish, mostly salt-water fish. It also indicated that the sheep were smaller than those of modern times and that the majority of the ox bones came from fairly old animals, the latter point suggesting that the monastic farmers were able to carry most of their stock over the winter. In this issue M. Ryder's article on the subject shows how archaeology adds to our knowledge of rural history.

"These maps show the boundaries of fields, woods, roads and streams and the position of buildings . . . The amount of detailed information they provide about land tenure, field systems and land use is unequalled by any other series of documents . . . They rank as the most complete record of the agrarian landscape at any period." Thus the article on the tithe surveys of the mid-nineteenth century by H. Prince demonstrates how official archives add to our knowledge of rural history.

Similarly, the hitherto unpublished letters of Bakewell, edited by Professor Pawson, and the account of plough rituals, by T. Davidson, illustrate how personal correspondence, anthropology and local records serve the same purpose. Sixteen pages of book reviews and a list of some 250 relevant books and articles published in one year show that agricultural historians are neglecting neither their materials nor their opportunities.

All this means bigger and better agricultural history. Clearly, the *Review* is doing the job it was designed to do. Equally clearly, however, its success is creating an ever-widening gap between the professional historian and the general agricultural reader. Faced with these collections of specialist papers by specialist investigators, laymen such as the farmer, land agent and advisory officer see at once that they cannot hope to use these varied chunks of new knowledge as a means of modernizing their inevitably obsolete views on our rural past. There is far too much in far too individual a form on far too many topics.

The *Review* gives us all this raw material admirably. But could it perhaps spare space for some intellectual processing of this material into a more generally digestible form? For example, could it include as a regular feature summarized reviews of new evidence on particular problems or, say, discussions between scholars concerned with different aspects of the same subject on the lines of the recent Third Programme series on Norman England? Of course, what the French so pleasantly call *vulgarisation* is not part of scholarship. But it is one of the means whereby the findings of scholarship could be made more readily available to "all those who are interested in agriculture as a living and historical process".

N.H.

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